FINANCIAL STATEMENT
As of 12/01/2100
Percent of Year Elapsed: 42

OIL AND GAS DIVISION
FY12 Budget vs. Expenditures

		2012 Regulatory Budget	Expends	Expends % of Budget	2012 UIC Budget	Expends	Expends % of Budget	2012 Education Outreach	Expends	Expends % of Budget	2012 EPA CO2 Primacy	Expends	Expends & of Budget	2012 TOTAL BUDGET	2012 TOTAL EXPENDS	Expends % of Budget
FTE		17.0			3.5									20.5		
Obj.																
1000	General PS	(2,133)												(2,133)		
1100	Salaries	1,075,334	322,958	0.30	185,181	78,364	0.55							1,322,355	426,084	0.32
1300	Other Comp		1,915	0.00	322	137	-									
1400	Benefits/Ins	-			61,518	22,710										
1600	Vacancy Savings				(9,884)									(9,884)		
2100	Contracted Svcs	531,225	41,268	0.08	66,135	3,510	0.05	1,500,000			250,000			2,347,360	44,778	0.02
2200	Supplies	53,019	22,140	0.42	9,526	4,123	0.43							62,545	26,263	0.42
2300	Communications	39,482	16,300	0.41	7,228	2,837	0.39							46,710	19,138	0.41
2400	Travel	32,092	11,545	0.36	6,612	1,223	0.19							38,704	12,768	0.33
2500	Rent	17,769	6,533	0.37	2,353	1,825	0.78							20,122	8,358	0.42
2600	Utilities	11,908	7,308	0.61	2,464	1,599	0.65							14,372	8,906	0.62
2700	Repair/Maint	9,722	5,899	0.61	2,896	1,557	0.54							12,618	7,456	0.59
2800	Other Expenses	28,857	2,925	0.10	16,909	907	0.05							45,766	3,832	0.08
3100	Equipment	35,575	-	0.00	12,500									48,075	-	
6000	Grants													-	-	
Total		1,832,850	438,790	0.24	363,760	118,792	0.33	1,500,000			250,000			3,946,610	557,582	0.14
FUNDING																
	State Special	1,819,114	438,790	0.24	256,209	118,792	0.46							3,839,059	557,582	0.15
	Federal				107,551	-	-							107,551		
Total Funds		1,819,114	438,790		363,760	118,792								3,946,610	557,582	

FY10 Carryforward Org 2013	
start balance	122,991
less exp	(1,250)
current bal	121,741

EXHIBIT 1

REVENUE INTO STATE SPECIAL REVENUE ACCOUNT 12/01/11

	FY12	FY11	Percentage FY12:FY11
Oil Production Tax	967,054	1,562,946	0.62
Gas Production Tax	119,524	265,464	0.45
Drilling Permit Fees	25,075	54,300	
UIC Permit Fees		208,650	
Enhanced Recovery Filing Fee		-	
Interest on Investments	5,971	40,332	0.15
Insurance Proceeds		-	
Accomodations Tax Rebate		491	
Copies of Documents	3,528	7,496	0.47
Miscellaneous Reimbursemts		25,300	
TOTALS	$ 1,121,151	$ 2,164,979	0.52

REVENUE INTO DAMAGE MITIGATION ACCOUNT as of 12/10/11

	FY11
Transfer in from Orphan Share	0
RIT Interest	0
Bond Forfeitures	0
Interest on Investments	223
TOTAL	$ 223

REVENUE INTO GENERAL FUND FROM FINES as of 12/14/11

	FY12
Brandon Oil	20
Kelly Oil & Gas LLC	10
Hofland, James D	20
Hofland, James D	80
Slohcin Inc.	10
Slawson Exploration Co	5,000
McOil Montana One LLC	120
Misc. Oil Co	10
Phoenix Energy Inc.	90
Mountain Pacific General	4,900
Justice Oilfield Water Service Inc	20
Valerie Wadman (Frank Miller)	10
ECA Holdings LP	10
Coalridge Disposal & Petroleum	10
SBG Sheridan Facility	1,000
Southside Oil & Gas LTD	40
Hawley Oil	340
Native American Energy Group	100
Grey Wolf Production Company	50
August Energy Services LLC (Jake Oil)	30
Grey Wolf Production Company	50
Phoenix Energy Inc.	90
Mountain Pacific General Inc	1,040
Lyon Oil	120
Bensun Energy	5,000
August Energy Services LLC (Jake Oil)	1,100
Frank Baxter	5,000
TOTAL	$ 24,270

BOND FORFEITURES AS OF 12/01/11
Go Into Damage Mitigation Account

North American Technical Trading Company	0	60,000
MSC Exploration		10,000
TOTAL		70,000

INVESTMENT ACCOUNT BALANCES 12/01/11

Oil & Gas ERA	3,250,130
Damage Mitigation	383,061

GRANT BALANCES - 12/01/11

Name	*Authorized Amt*	*Expended*	*Balance*
2009 Northern	300,000	0	300,000
2009 Southern	300,000	0	300,000
2007 Tank Battery	304,847	166,048	138,799
TOTALS	$904,847	$166,048	$738,799

CONTRACT BALANCES - 12/01/2011

HydroSolutions - Tongue River Info Project	1,218,486	1,218,486	0
Automated Maintenance Services, Inc.	27,458	5,819	21,639
Agency Legal Services - Legal	60,000	7,574	52,426
Central Avenue Mall	400	400	0
ALL-LLC - FY11 Engineering & Database Maint.	20,000	0	20,000
Liquid Gold Well Service, Inc. - 09 Northern	165,000	0	165,000
Liquid Gold Well Service, Inc. - 09 Southern	165,000	0	165,000
C-Brewer - 07 Southern Tank Battery (og-cb-134)	215,000	166,048	48,952
TOTALS	1,871,344	1,398,327	473,017

Agency Legal Services Expenditures in FY12

Case	Amt Spent	Last Svc Date
BOGC Duties	7,574	10/11
Total	7,574	

Montana Board of Oil and Gas Conservation
Summary of Bond Activity

10/11/2011 Through 12/14/2011

Approved

A. B. Energy LLC Chester MT		693 M1	Approved Amount: Purpose:	10/11/2011 $50,000.00 Multiple Well Bond
Certificate of Deposit	$50,000.00	FIRST STATE BANK OF SHELBY		
Avery Bakken Disposals, LLC Stanley ND		694 T1	Approved Amount: Purpose:	10/13/2011 $10,000.00 UIC Single Well Bond
Certificate of Deposit	$10,000.00	STOCKMAN BANK, SIDNEY		
Charger Resources, LLC North Richland Hills TX		697 M1	Approved Amount: Purpose:	12/5/2011 $50,000.00 Multiple Well Bond
Surety Bond	$50,000.00	U.S. Specialty Insurance Co.		
Keesun Corporation Cut Bank MT		2545 T2	Approved Amount: Purpose:	11/15/2011 $5,000.00 UIC Single Well Bond
Certificate of Deposit	$5,000.00	Stockman Bank, Cut Bank		
Kelly Oil and Gas LLC Roundup MT		645 T3	Approved Amount: Purpose:	11/3/2011 $10,000.00 UIC Single Well Bond
Letter of Credit	$10,000.00	FIRST SECURITY BANK OF ROUNDUP		
Kelly Oil and Gas LLC Roundup MT		645 T2	Approved Amount: Purpose:	11/3/2011 $10,000.00 UIC Single Well Bond
Letter of Credit	$10,000.00	FIRST SECURITY BANK OF ROUNDUP		
Kelly Oil and Gas LLC Roundup MT		645 T1	Approved Amount: Purpose:	11/3/2011 $10,000.00 UIC Single Well Bond
Letter of Credit	$10,000.00	FIRST SECURITY BANK OF ROUNDUP		
Landtech Enterprises, LLC Sidney MT		4245 T3	Approved Amount: Purpose:	11/14/2011 $10,000.00 UIC Single Well Bond
Certificate of Deposit	$10,000.00	Wells Fargo Bank, NA		
Shadwell Resources Group, LLC Richmond TX		687 T2	Approved Amount: Purpose:	10/24/2011 $10,000.00 UIC Single Well Bond
Certificate of Deposit	$10,000.00	Wells Fargo Bank, NA		
Tomahawk Oil Company, Inc. Roundup MT		7620 T2	Approved Amount: Purpose:	11/18/2011 $10,000.00 UIC Single Well Bond
Letter of Credit	$10,000.00	FIRST SECURITY BANK OF ROUNDUP		

Montana Board of Oil and Gas Conservation
Summary of Bond Activity

10/11/2011 Through 12/14/2011

Approved

Vaalco Energy (USA), Inc. Houston TX		696 M1	Approved Amount: Purpose:	10/25/2011 $50,000.00 Multiple Well Bond
Surety Bond	$50,000.00	RLI INSURANCE COMPANY		
Windy Butte Reclamation Facility, LLC Powers Lake ND		695 T1	Approved Amount: Purpose:	10/24/2011 $10,000.00 UIC Single Well Bond
Certificate of Deposit	$10,000.00	STOCKMAN BANK, SIDNEY		

Forfeited

MSC Exploration LP Houston TX		578 G2	Forfeited Amount: Purpose:	10/21/2011 $5,000.00 Single Well Bond
Certificate of Deposit	$5,000.00	Independence Bank		
MSC Exploration LP Houston TX		578 G1	Forfeited Amount: Purpose:	10/21/2011 $5,000.00 Single Well Bond
Certificate of Deposit	$5,000.00	Independence Bank		
North American Technical Trading Company, Inc. Oakbrook Terrace IL		398 T1	Forfeited Amount: Purpose:	10/31/2011 $10,000.00 UIC Single Well Bond
Certificate of Deposit	$10,000.00	Yellowstone Bank		
North American Technical Trading Company, Inc. Oakbrook Terrace IL		398 T2	Forfeited Amount: Purpose:	10/31/2011 $10,000.00 UIC Single Well Bond
Certificate of Deposit	$10,000.00	Yellowstone Bank		
North American Technical Trading Company, Inc. Oakbrook Terrace IL		398 G4	Forfeited Amount: Purpose:	10/31/2011 $10,000.00 Single Well Bond
Certificate of Deposit	$10,000.00	Yellowstone Bank		
North American Technical Trading Company, Inc. Oakbrook Terrace IL		398 G3	Forfeited Amount: Purpose:	10/31/2011 $10,000.00 Single Well Bond
Certificate of Deposit	$10,000.00	Yellowstone Bank		
North American Technical Trading Company, Inc. Oakbrook Terrace IL		398 G2	Forfeited Amount: Purpose:	10/31/2011 $10,000.00 Single Well Bond
Certificate of Deposit	$10,000.00	Yellowstone Bank		
North American Technical Trading Company, Inc. Oakbrook Terrace IL		398 G1	Forfeited Amount: Purpose:	10/31/2011 $10,000.00 Single Well Bond
Certificate of Deposit	$10,000.00	Yellowstone Bank		

Released

Montana Board of Oil and Gas Conservation
Summary of Bond Activity

10/11/2011 Through 12/14/2011

Released

Oil Quest Resources, Inc. Arvada CO		5583 M1	Released Amount: Purpose:	11/28/2011 $25,000.00 Multiple Well Bond
Certificate of Deposit	$25,000.00	NORWEST BANK OF HELENA, N A		
Sonalta Resources, Inc. Scottsdale AZ		408 G1	Released Amount: Purpose:	10/20/2011 $5,000.00 Single Well Bond
Certificate of Deposit	$5,000.00	1ST INTERSTATE BANK WEST BLGS.		
Startech Energy Corp. CALGARY AB		201 M1	Released Amount: Purpose:	12/2/2011 $25,000.00 Multiple Well Bond
Certificate of Deposit	$25,000.00	1ST INTERSTATE BANK GREATFALLS		
Stone Energy Corporation Denver CO		446 G1	Released Amount: Purpose:	11/14/2011 $10,000.00 Single Well Bond
Surety Bond	$10,000.00	Argonaut Insurance Company		
Weststar Energy, Inc. Worland WY		8330 B1	Released Amount: Purpose:	10/11/2011 $10,000.00 Blanket Bond
Surety Bond	$10,000.00	RLI INSURANCE COMPANY		

EXHIBIT 3

Docket Summary

12/15/2011 Hearing

462-2011	Montana Board of Oil & Gas	Special statewide spacing;			☐
463-2011	Fidelity Exploration & Production Co.	Temporary spacing unit, Bakken/Three Forks Formations, 21N-56E-13: all, 24: all, 200' heel/toe, 1320' lateral setbacks. Apply for permanent spacing within 90 days of completion. Default request.	**Default**		☐
464-2011	Fidelity Exploration & Production Co.	Temporary spacing unit, Bakken/Three Forks Formations, 21N-57E-4: all, 9: all, 200' heel/toe, 1320' lateral setbacks. Apply for permanent spacing within 90 days of completion. Default request.	**Withdrawn**	*Withdrawn, fax recd 12/5/2011.*	☐
465-2011	Fidelity Exploration & Production Co.	Temporary spacing unit, Bakken/Three Forks Formations, 21N-57E-25: all, 36: all, 200' heel/toe, 1320' lateral setbacks. Apply for permanent spacing within 90 days of completion. Default request.	**Default**		☐
466-2011	Fidelity Exploration & Production Co.	Temporary spacing unit, Bakken/Three Forks Formations, 22N-57E-25: all, 36: all, 200' heel/toe, 1320' lateral setbacks. Apply for permanent spacing within 90 days of completion. Default request.		*660' offset to heel/toe to the north.*	☑
467-2011	Fidelity Exploration & Production Co.	Temporary spacing unit, Bakken/Three Forks Formations, 22N-57E-22: all, 23: all, 200' heel/toe, 1320' lateral setbacks. Apply for permanent spacing within 90 days of completion. Default request.		*660' offset to heel/toe to the east.*	☑
468-2011	Whiting Oil and Gas Corporation	Rehearing request by Andy Ostby, Order 270-2011 granting temporary spacing unit, Bakken/Three Forks Formations, 30N-56E-27: all, 34: all, 660' heel/toe, 1320' lateral setbacks; also rehearing of Docket 455-2011, protest of G3 application for permit to drill.		*[Docket 455-2011 was withdrawn at October hearing.]*	☐
469-2011	Primary Petroleum Company USA, Inc.	Protest by Stephen Hutton and Lisa Schmidt; permit to drill an oil well in 28N-4W-5: SESE (380' FSL, 660' FEL).	**Protested**		☐
470-2011	XTO Energy Inc.	Amend Order 142-2010 to allow 200' heel/toe and 1320' lateral setback in temporary spacing unit comprised of 27N-57E-1: all, 2: all, Bakken/Three Forks Formation. Apply for permanent spacing within 90 days of completion. Default request.	**Default**	*660' setbacks in original order.*	☐
471-2011	XTO Energy Inc.	Amend Order 144-2010 to allow 200' heel/toe and 1320' lateral setback in temporary spacing unit comprised of 28N-57E-35: all, 36: all, Bakken/Three Forks Formation. Apply for permanent spacing within 90 days of completion. Default request.	**Default**	*660' setbacks in original order.*	☐
472-2011	XTO Energy Inc.	Pool, Bakken Formation, permanent spacing unit, 23N-58E-25: all and 23N-59E-30: all (Witt 13X-25). Non-consent penalties requested.		*PSU by Order 227-2011*	☐
473-2011	XTO Energy Inc.	Pool, Bakken Formation, permanent spacing unit, 23N-58E-24: all and 23N-59E; 19: all (Sherlock 13X-24). Non-consent penalties requested.		*PSU by Order 321-2011.*	☐
474-2011	Marathon Oil Company	Temporary spacing unit, Bakken/Three Forks Formations, 31N-58E-3: all, 10: all, 200' heel/toe, 1320' lateral setbacks. Apply for permanent spacing within 90 days of completion. Default request.	**Default**		☐
475-2011 6-2012 F	Marathon Oil Company	Temporary spacing unit, Bakken/Three Forks Formations, 31N-59E-4: all, 9: all, 200' heel/toe, 1320' lateral setbacks. Apply for permanent spacing within 90 days of completion. Default request.	**Default**		☐

476-2011	Marathon Oil Company	Amend Order 86-2010 to allow 200' heel/toe and 1320' lateral setback in temporary spacing unit comprised of 31N-59E-29: all, 32: all, Bakken/Three Forks Formation. Apply for permanent spacing within 90 days of completion. Default request.	**Default**	*660' setback in original order.*	☐
477-2011	Marathon Oil Company	Amend Order 57-2010 to allow 200' heel/toe and 1320' lateral setback in temporary spacing unit comprised of 31N-58E-13: all, 24: all, Bakken/Three Forks Formation. Apply for permanent spacing within 90 days of completion. Default request.	**Default**	*660' setbacks only in original order.*	☐
478-2011 5-2011 F	Marathon Oil Company	Amend Order 5-2011 to allow 200' heel/toe and 1320' lateral setback in temporary spacing unit comprised of 31N-58E-14: all, 23: all, Bakken/Three Forks Formation. Apply for permanent spacing within 90 days of completion. Default request.	**Default**	*660'/1320' setbacks in original order.*	☐
479-2011 7-2012 F	Triangle Petroleum Corporation	Vacate Order 18-1990. Temporary spacing unit, Bakken/Three Forks Formations, 30N-58E-2: all, 11: all, 200' heel/toe, 1320' lateral setbacks. Apply for permanent spacing within 90 days of completion. Default request.	**Continued**	*(Existing Bakken Formation spacing unit requested by Oryx in 1990....)* *[WRONG COUNTY.] Continued, fax recd 12/5/2011.*	☐
480-2011	Bensun Energy, LLC	Class II saltwater disposal permit, Dakota Formation, BN 12-11 (API #025-21021), 9N-58E-11: 1980' FNL/ 770' FWL (SW/4NW/4).		*likely to be protested;* *[HEAR AFTER 570-2011 IF REHEARING GRANTED.]*	☐
481-2011	Energy Corporation of America	Class II disposal permit, Sundance Formation, Foothills 1-D undrilled well, 6S-17E-14: 497' FSL/13' FEL (SE/4SE/4).	**Default**		☐
482-2011	TAQA North USA, Inc.	Permanent spacing unit, Bakken Formation, 37N-56E-17: all (Kavon 17-16H).			☐
483-2011	TAQA North USA, Inc.	Permanent spacing unit, Bakken Formation, 37N-58E-5: all (Westgaard 5-5H).			☐
484-2011	TAQA North USA, Inc.	Exception to drill up to three additional wells, Bakken Formation, permanent spacing unit, 37N-56E-17: all, 660' setback. Default request.	**Default**	*Permanent spacing requested under Docket 482-2011.*	☐
485-2011	TAQA North USA, Inc.	Exception to drill up to three additional wells, Bakken Formation, permanent spacing unit, 37N-57E-12: all, 660' setback. Default request.	**Default**	*Permanently spaced by Order 370-2011.*	☐
486-2011	TAQA North USA, Inc.	Exception to drill up to three additional wells, Bakken Formation, permanent spacing unit, 37N-58E-5: all, 660' setback. Default request.	**Default**	*Permanent spacing requested under Docket 483-2011.*	☐
487-2011	Central Montana Resources, LLC	Temporary spacing unit, Heath Formation, 12N-38E-34: all, 330' setback. Apply for permanent spacing within 90 days of completion.	**Continued**	*330' setback requested.* *Continued, fax recd 12/5/2011.*	☑
488-2011 8-2012 F	G3 Operating, LLC	Temporary spacing unit, Bakken Formation, 30N-57E-14: all, 23: all, 200' heel/toe, 1320' lateral setbacks. Apply for permanent spacing within 90 days of completion. Default request.		*Previously spaced, Order 314-2010 W/ 660 Setback - AMEND EXISTING ORDER ??*	☑

489-2011	Topaz Oil & Gas Inc	Clarification of spacing units, Colorado Group, 32N-33E-14: NW/4 (Scheele 4), 14: SW/4 (Scheele 5), 22: SE/4 (White 5). Pooling request based on surface acreage.	*Change "Colorado Group of Formations" to "Niobrara through Belle Fourche Formations" or "all zones, surface to the base of the Belle Fourche".*	☐
490-2011	NFR Bear Paw Basin, LLC	Vacate Order 326-2003. Create permanent spacing unit, Eagle Formation, 36N-15E-26: SW/4SW/4, 27: SE/4SE/4, 34: NE/4NE/4, 35: NW/4NW/4 (Willow Creek 34-1-36-15B).	*Order 326-2003 created a temporary spacing unit comprised of all of Section 27. Order 56-2010 created a temporary spacing of lands described in this application.*	☐
491-2011	Whiting Oil and Gas Corporation	Temporary spacing unit, Bakken/Three Forks Formations, 25N-58E-5: all, 8: all, 200' heel/toe, 1320' lateral setbacks. Apply for permanent spacing within 90 days of completion.	*No exhibits filed; will hear along with other Whiting applications.*	☐
492-2011	Whiting Oil and Gas Corporation	Amend Order 260-2011 to allow 200' heel/toe and 500' lateral setback in temporary spacing unit comprised of 26N-57E-2: all, 11: all and allow up to four Bakken/Three Forks Formation wells.	*originally 660/1320; TSU, undrilled. Setback amendment OK.* *[ADDITIONAL WELLS IN UNDRILLED TSU.]*	☑
493-2011	Whiting Oil and Gas Corporation	Amend Order 262-2011 to allow 200' heel/toe and 500' lateral setback in temporary spacing unit comprised of 26N-57E-14: all, 23: all and allow up to four Bakken/Three Forks Formation wells.	*originally 660/1320; TSU, no wells. Setback amendment OK.* *[ADDITIONAL WELLS IN UNDRILLED TSU.]*	☑
494-2011	Whiting Oil and Gas Corporation	Amend Order 261-2011 to allow 200' heel/toe and 500' lateral setback in temporary spacing unit comprised of 26N-57E-13: all, 24: all and allow up to four Bakken/Three Forks Formation wells.	*Originally 660/1320. Setback amendment OK.* *[ADDITIONAL WELLS IN UNDRILLED TSU.]*	☑
495-2011	Whiting Oil and Gas Corporation	Temporary spacing unit, Bakken/Three Forks Formations, 26N-57E-16: all, 21: all, 200' heel/toe, 500' lateral setbacks, and authorize up to four wells. Apply for permanent spacing within 90 days of completion.	*TSU request OK.* *[REQUESTS ADDITIONAL WELLS WITH SPACING.]*	☑
496-2011	Whiting Oil and Gas Corporation	Temporary spacing unit, Bakken/Three Forks Formations, 27N-57E-28: all, 33: all, 200' heel/toe, 500' lateral setbacks, and authorize up to four wells. Apply for permanent spacing within 90 days of completion.	*TSU request OK.* *[REQUESTS ADDITIONAL WELLS WITH SPACING.]*	☑
497-2011	Whiting Oil and Gas Corporation	Temporary spacing unit, Bakken/Three Forks Formations, 25N-57E-26: all, 35: all, 200' heel/toe, 500' lateral setbacks, and authorize up to four wells. Apply for permanent spacing within 90 days of completion.	*TSU request OK.* *[REQUESTS ADDITIONAL WELLS WITH SPACING.]*	☑
498-2011	Whiting Oil and Gas Corporation	Temporary spacing unit, Bakken/Three Forks Formations, 25N-57E-30: all, 31: all, 200' heel/toe, 500' lateral setbacks, and authorize up to four wells. Apply for permanent spacing within 90 days of completion.	*660' setback in PSU to the south.* *[REQUESTS ADDITIONAL WELLS WITH SPACING.]*	☑
499-2011	Whiting Oil and Gas Corporation	Temporary spacing unit, Bakken/Three Forks Formations, 25N-57E-15: all, 22: all, 200' heel/toe, 500' lateral setbacks, and authorize up to four wells. Apply for permanent spacing within 90 days of completion.	*TSU request OK.* *[REQUESTS ADDITIONAL WELLS WITH SPACING.]*	☑
500-2011	Whiting Oil and Gas Corporation	Temporary spacing unit, Bakken/Three Forks Formations, 25N-57E-4: all, 9: all, 200' heel/toe, 500' lateral setbacks, and authorize up to four wells. Apply for permanent spacing within 90 days of completion.	*TSU request OK* *[REQUESTS ADDITIONAL WELLS WITH SPACING.]*	☑

501-2011	Whiting Oil and Gas Corporation	Temporary spacing unit, Bakken/Three Forks Formations, 25N-57E-16: all, 21: all, 200' heel/toe, 500' lateral setbacks, and authorize up to four wells. Apply for permanent spacing within 90 days of completion.		*TSU request OK.* *[REQUESTS ADDITIONAL WELLS WITH SPACING.]*	☑
502-2011	Whiting Oil and Gas Corporation	Temporary spacing unit, Bakken/Three Forks Formations, 23N-58E-1: all, 12: all, 200' heel/toe, 500' lateral setbacks, and authorize up to four wells. Apply for permanent spacing within 90 days of completion.	**Withdrawn**	*Existing TSU by Order 21-2011; 1320/660.* *Amend Order 502-2011 for setback?* *Permitted well - XTO. [WITHDRAWN, FAX RECD 12/13/2011.]* *[REQUESTS ADDITIONAL WELLS, SPACING ESTABLISHED BY EARLIER ORDER.]*	☑
503-2011	Whiting Oil and Gas Corporation	Temporary spacing unit, Bakken/Three Forks Formations, 25N-58E-1: all, 12: all, 200' heel/toe, 500' lateral setbacks, and authorize up to four wells. Apply for permanent spacing within 90 days of completion.	**Continued**	*Existing TSU by Order 140-2011; 1320/660.* *Amend Order 503-2011 for 200' setback?* *[CONTINUED, FAX RECD 12/13/2011.]* *[REQUESTS ADDITIONAL WELLS, SPACING ESTABLISHED BY EARLIER ORDER.]*	☑
504-2011	Whiting Oil and Gas Corporation	Temporary spacing unit, Bakken/Three Forks Formations, 26N-57E-6: all, 7: all, 200' heel/toe, 500' lateral setbacks, and authorize up to four wells. Apply for permanent spacing within 90 days of completion.		*TSU request OK.* *[REQUESTS ADDITIONAL WELLS WITH SPACING.]*	☑
505-2011	Brigham Oil & Gas LP	Amend Order 180-2010 to allow 200' heel/toe and 1320' lateral setback in temporary spacing unit comprised of 28N-57E-30: all, 31: all, Bakken/Three Forks Formation. Apply for permanent spacing within 90 days of completion. Default request.	**Continued**	*(see 511-2011 - additional wells.)* *Continued, email recd 12/7/2011.*	☐
506-2011	Brigham Oil & Gas LP	Temporary spacing unit, Bakken/Three Forks Formations, 25N-58E-25: all, 36: all, 200' heel/toe, 1320' lateral setbacks. Apply for permanent spacing within 90 days of completion. Default request.	**Default**	*(See 512-2011, additional wells.)*	☐
507-2011 12-2011 F	Brigham Oil & Gas LP	Amend Order 33-2011 to allow 200' heel/toe and 1320' lateral setback in temporary spacing unit comprised of 28N-57E-20: all, 21: all, Bakken/Three Forks Formation. Apply for permanent spacing within 90 days of completion. Default request.	**Default**	*Originally 660/1320; setback amendment OK.* *(See 510-2011, additional wells.)*	☐
508-2011	Brigham Oil & Gas LP	Amend Order 301-2010 to allow 200' heel/toe and 1320' lateral setback in temporary spacing unit comprised of 26N-57E-3: all, 10: all, Bakken/Three Forks Formation. Apply for permanent spacing within 90 days of completion. Default request.	**Continued**	*660' setbacks in original order; setback amendment OK.* *(See 509-2011, additional wells.)* *Continued, email recd 12/7/2011.*	☐
509-2011	Brigham Oil & Gas LP	Exception to drill up to four wells, Bakken/Three Forks Formations, permanent spacing unit, 26N-57E-3: all, 10: all, 200' heel/toe, 500' lateral setback. Default request.	**Continued**	*(See 508-2011, setback amendment for initial well.)* *Continued, email recd 12/7/2011.* *[ADDITIONAL WELLS, UNDRILLED TSU.]*	☑
510-2011 9-2012 F	Brigham Oil & Gas LP	Exception to drill up to four wells, Bakken/Three Forks Formations, permanent spacing unit, 28N-57E-20: all, 21: all, 200' heel/toe, 500' lateral setback. Default request.		*(See 507-2011, setback amendment for initial well.)* *[ADDITIONAL WELLS, UNDRILLED TSU.]*	☑
511-2011	Brigham Oil & Gas LP	Exception to drill up to four wells, Bakken/Three Forks Formations, permanent spacing unit, 28N-57E-30: all, 31: all, 200' heel/toe, 500' lateral setback. Default request.	**Continued**	*(See 505-2011, setback amendment for initial well.)* *Continued, email recd 12/7/2011.* *[ADDITIONAL WELLS, UNDRILLED TSU]*	☑

512-2011	Brigham Oil & Gas LP	Exception to drill up to four wells, Bakken/Three Forks Formations, permanent spacing unit, 25N-58E-25: all, 36: all, 200' heel/toe, 500' lateral setback. Default request.		*(See 506-2011, temporary spacing.)* *[ADDITIONAL WELLS, UNDRILLED TSU]*	☑
513-2011 11-2012 F	Brigham Oil & Gas LP	Exception to drill up to four wells, Bakken/Three Forks Formations, temporary spacing unit, 27N-57E-6: all, 7: all, 200' heel/toe, 500' lateral setback. Default request.		*SPACING UNIT REQUESTED UNDER DOCKET 430-2011.* *[ADDITIONAL WELLS, UNDRILLED TSU]*	☑
514-2011 12-2012 F	Brigham Oil & Gas LP	Exception to drill up to four wells, Bakken/Three Forks Formations, temporary spacing unit, 28N-57E-1: all, 12: all, 200' heel/toe, 500' lateral setback. Default request.		*TSU by Order 31-2011, undrilled; Docket 416-2011 requests initial well heel/toe setback of 200'* *[ADDITIONAL WELLS, UNDRILLED TSU]*	☑
515-2011 13-2012 F	Brigham Oil & Gas LP	Exception to drill up to four wells, Bakken/Three Forks Formations, temporary spacing unit, 28N-57E-23: all, 26: all, 200' heel/toe, 500' lateral setback. Default request.		*TSU by Order 35-2011, undrilled; Docket 418-2011 requests initial well toe/heel setback of 200'.* *[ADDITIONAL WELLS, UNDRILLED TSU]*	☑
516-2011	Brigham Oil & Gas LP	Exception to drill up to four wells, Bakken/Three Forks Formations, temporary spacing unit, 25N-58E-15: all, 22: all, 200' heel/toe, 500' lateral setback. Default request.		*Undrilled TSU by Order 187-2011, 1320/200.* *[ADDITIONAL WELLS, UNDRILLED TSU]*	☑
517-2011	Brigham Oil & Gas LP	Exception to drill up to four wells, Bakken/Three Forks Formations, permanent spacing unit, 25N-59E-16: all, 21: all, 200' heel/toe, 500' lateral setback. Default request.		*PSU (BAKKEN) by Order 192-2007; additional well (660' setbacks) authorized by 36-2011. [?? NEED TO VACATE ORDER 36-2011 ??]*	☑
518-2011	Continental Resources Inc	Amend Order 161-2007 to allow 200' heel/toe and 500' lateral setback in permanent spacing unit comprised of 23N-55E-24: all, 25: all and allow up to four Bakken/Three Forks Formation wells. Default request.	**Continued**	*[ELM COULEE] OVERLAPPING TSU, SECTIONS 23, 24, 25, 26; BOUNDARY WELL NOT DRILLED. Developed (3 wells, 660' setback) spacing unit to the north. 500' setback questionable with existing development. (Overlapping TSU by Order 345-2008.) Continued, email recd 12/6/2011.*	☑
519-2011	Continental Resources Inc	Amend Order 245-2006 to allow 200' heel/toe and 500' lateral setback in permanent spacing unit comprised of 23N-55E-22: all, 27: all and allow up to four Bakken/Three Forks Formation wells. Default request.		*[ELM COULEE] OVERLAPPING TSU SECTIONS 22, 23, 26, 27 BY ORDER 341-2008; BOUNDARY WELL AND ADJACENT WELL IN 23/26 PSU NOT DRILLED. Developed (3 wells, 660' setback) spacing unit to the north. Requested 500' lateral setback to east conflicts with overlapping spacing unit (Sections 22, 27, 23, 26) in Order 341-2008.*	☑
520-2011	Continental Resources Inc	Vacate Order 354-2011that established a temporary spacing unit, 26N-54E-4: all, 9: all. Default request.		*[HEAR WITH DOCKET 521-2011 - 3-SECTION TSU, SECTIONS 4, 9, & 16.]*	☐
521-2011	Continental Resources Inc	Temporary spacing unit, Bakken/Three Forks Formations, 26N-54E-4: all, 9: all, 16: all, 200' heel/toe, 1320' lateral setbacks. Apply for permanent spacing within 90 days of completion. Default request.		*3-Section spacing unit. Request to vacate existing TSU included in Docket 520-2011.*	☐
522-2011	Continental Resources Inc	Amend Order 164-2008 to allow 200' heel/toe and 500' lateral setback in permanent spacing unit comprised of 23N-54E-3: all, 24N-54E-34: all and allow up to four Bakken/Three Forks Formation wells. Default request.	**Continued**	*[ELM COULEE] Permanent spacing unit. 500' setback questionable with existing development, 660' setbacks in offsetting spacing units. [No exhibits.] Continued, email recd 12/6/2011.*	☑

523-2011	Continental Resources Inc	Amend Order 130-2006 to allow 200' heel/toe and 500' lateral setback in permanent spacing unit comprised of 25N-55E-10: all, 15: all and allow up to four Bakken/Three Forks Formation wells. Default request.		*[ELM COULEE - PARTIAL] PSU by Order 124-2006; additional well authorized by Order 130-2006.* *Would be eligible for default except for questions about 500' lateral setback on east & 660' setback in PSU to south.*	☑
524-2011	Continental Resources Inc	Amend Order 164-2007 to allow 200' heel/toe and 500' lateral setback in permanent spacing unit comprised of 23N-54E-5: all, 24N-54E-32: all and allow up to four Bakken/Three Forks Formation wells. Default request.		*[ELM COULEE] PSU by Order 448-2005, 2 additional wells authorized by 164-2007, 466-2005. Offsetting 640-acre PSU's to north & south, 660' setback for wells parallel to boundary. 500' lateral setback request questionable.*	☑
525-2011	Continental Resources Inc	Amend Order 167-2007 to allow 200' heel/toe and 500' lateral setback in permanent spacing unit comprised of 24N-53E-18: all, 19: all and allow up to four Bakken/Three Forks Formation wells. Default request.		*[ELM COULEE] PSU by Order 389-2006, 2 wells with an additional well authorized by Order 167-2007. 660' parallel offset to the south. 500' lateral setback to west questionable.*	☑
526-2011	Continental Resources Inc	Amend Order 163-2007 to allow 200' heel/toe and 500' lateral setback in permanent spacing unit comprised of 23N-54E-4: all, 9: all and allow up to four Bakken/Three Forks Formation wells. Default request.		*[ELM COULEE] PSU by Order 215-2005; two existing and 1 authorized additional well. 660' setback in PSU to north, east and west; 500' lateral setback questionable.*	☑
527-2011	Continental Resources Inc	Amend Order 162-2008 to allow 200' heel/toe and 500' lateral setback in permanent spacing unit comprised of 24N-54E-18: all, 19: all and allow up to four Bakken/Three Forks Formation wells. Default request.	**Continued**	*[ELM COULEE] Overlap of this spacing unit authorized by 276-2008; 500' setback on east conflicts with overlapping spacing unit? Continued, email recd 12/6/2011.*	☑
528-2011	Continental Resources Inc	Amend Order 163-2008 to allow 200' heel/toe and 500' lateral setback in permanent spacing unit comprised of 24N-54E-17: all, 20: all and allow up to four Bakken/Three Forks Formation wells. Default request.	**Continued**	*[ELM COULEE] Overlap of this spacing unit authorized by 276-2008; 500' setback to west conflicts?* *Continued, email recd 12/6/2011.*	☑
529-2011	Continental Resources Inc	Amend Order 162-2007 to allow 200' heel/toe and 500' lateral setback in permanent spacing unit comprised of 23N-55E-23: all, 26: all and allow up to four Bakken/Three Forks Formation wells. Default request.	**Continued**	*[ELM COULEE] 500' setback questionable. Overlapping TSU by Order 345-2008; offsetting spacing unit to north developed with 3 wells @ 660' setback. Continued, email recd 12/6/2011.*	☑
530-2011	Continental Resources Inc	Amend Order 291-2008 and 156-2009 to allow 200' heel/toe and 500' lateral setback in permanent spacing unit comprised of 24N-52E-1: all, 12: all and allow up to four Bakken/Three Forks Formation wells. Default request.	**Continued**	*[ELM COULEE] ?? Placement of 4 wells ?? 660' setbacks in offsetting spacing units. Continued, email recd 12/6/2011.*	☑
531-2011	Continental Resources Inc	Amend Order 169-2007 to allow 200' heel/toe and 500' lateral setback in permanent spacing unit comprised of 25N-55E-22: all, 27: all and allow up to four Bakken/Three Forks Formation wells. Default request.	**Continued**	*[ELM COULEE] ?? 500' ?? Overlapping TSU (Sections 22, 27, 21, 28) by Order 344-2008; problem w/ 500' setback to the west. Continued, email recd 12/6/2011.*	☑
532-2011	Continental Resources Inc	Amend Order 165-2007 to allow 200' heel/toe and 500' lateral setback in permanent spacing unit comprised of 24N-54E-30: all, 31: all and allow up to four Bakken/Three Forks Formation wells. Default request.	**Continued**	*[ELM COULEE] ?? 500' ?? 660's setbacks in offsetting spacing units. Proposed well placement ??* *Continued, email recd 12/6/2011.*	☑

533-2011	Continental Resources Inc	Amend Order 349-2005 to allow 200' heel/toe and 1320' lateral setback, temporary spacing unit comprised of 27N-54E-13: all, 24: all, Bakken/Three Forks Formation. Default request.	**Continued**	*Continued, email recd 12/6/2011.*	☐
534-2011	Continental Resources Inc	Amend Order 350-2005 to allow 200' heel/toe and 1320' lateral setback, temporary spacing unit comprised of 27N-53E-30: all, 31: all, Bakken/Three Forks Formation. Default request.	**Default**		☐
535-2011	Continental Resources Inc	Amend Order 354-2005 to allow 200' north/south and 1320' lateral setback, temporary spacing unit comprised of 27N-54E-30: all, 31: all, Bakken/Three Forks Formation. Default request.	**Continued**	*(Notice should have been corrected to "heel/toe" and "lateral" setback.)*	☐
536-2011	Continental Resources Inc	Amend Order 425-2005 to allow 200' north/south and 1320' east/west setback, temporary spacing unit comprised of 27N-53E-3: all, 10: all, Bakken/Three Forks Formation. Default request.		*(Notice should have been corrected to "heel/toe" and "lateral" setback.)* *[BLM - REQUEST TO HEAR RECD 12/7/2011]*	☐
537-2011	Continental Resources Inc	Amend Order 428-2005 to allow 200' heel/toe and 1320' lateral setback, temporary spacing unit comprised of 27N-54E-29: all, 32: all, Bakken/Three Forks Formation. Default request.	**Continued**	*Overlapping spacing unit; Section 32 - Three Forks; [TEMPORARY SPACING ONLY FOR BAKKEN].* *Continued, email recd 12/6/2011.*	☐
538-2011 14-2012 F	Continental Resources Inc	Temporary spacing unit, Bakken/Three Forks Formations, 27N-53E-2: all, 11: all, 200' heel/toe, 1320' lateral setbacks. Apply for permanent spacing within 90 days of completion. Default request.		*EXISTING SPACING UNIT, SECTIONS 11 & 14 (ORDER 216-2008, WHICH WOULD NEED TO BE VACATED)) Creates orphan tract - Section 14* *BLM - REQUEST TO HEAR RECD 12/7/2011.* *NOTICE ADEQUATE ??*	☑
539-2011 15-2012 F	Continental Resources Inc	Temporary spacing unit, Bakken/Three Forks Formations, 27N-55E-4: all, 9: all, 200' heel/toe, 1320' lateral setbacks. Apply for permanent spacing within 90 days of completion. Default request.	**Continued**	*Continued, email recd 12/6/2011.* *BLM - REQUEST TO HEAR RECD 12/7/2011.*	☐
540-2011 1-2006 F	Continental Resources Inc	Amend Order 426-2005 to allow 200' north/south and 1320' east/west setback, temporary spacing unit comprised of 27N-53E-1: all, 12: all, 200' heel/toe, 1320' east/west setbacks. Default request.	**Continued**	*(Notice should have been corrected to "heel/toe" and "lateral" setback.)* *BLM - REQUEST TO HEAR RECD 12/7/2011.* *Continued, email recd 12/6/2011.*	☐
541-2011 11-2005 F	Continental Resources Inc	Amend Order 345-2005 to allow 200' heel/toe and 1320' lateral setback, temporary spacing unit comprised of 27N-54E-6: all, 7: all, 200' north/south, 1320' east/west setbacks. Default request.		*660' setbacks in original order.* *BLM - REQUEST TO HEAR RECD 12/7/2011.*	☐
542-2011	Continental Resources Inc	Temporary spacing unit, Bakken/Three Forks Formations, 25N-57E-18: all, 19: all, 200' heel/toe, 1320' lateral setbacks. Apply for permanent spacing within 90 days of completion. Default request.	**Default**		☐
543-2011	Continental Resources Inc	Permanent spacing unit, Bakken/Three Forks Formation, 26N-56E-15: all, 22: all (Herness 1-15H).	**Continued**	*Continued, email recd 12/6/2011.*	☐
544-2011	Continental Resources Inc	Permanent spacing unit, Bakken/Three Forks Formation, 25N-55E-2: all, 11: all (Cochrane 1-11H).			☐
545-2011	Continental Resources Inc	Pool, Bakken/Three Forks Formation, permanent spacing unit, 25N-55E-2: all, 11: all (Cochrane 1-11H). Non-consent or non-joinder penalties requested.			☐

546-2011	Continental Resources Inc	Permanent spacing unit, Bakken/Three Forks Formation, 25N-55E-13: all, 24: all (Benny 1-13H).	**Continued**	*Continued, email recd 12/6/2011.*	☐
547-2011	Continental Resources Inc	Amend Order 10-2009 and 109-2009 to allow 200' heel/toe and 500' lateral setback in temporary spacing unit comprised of 23N-55E-20: all, 29: all and allow up to four Bakken/Three Forks Formation wells. Default request.		*[ELM COULEE OFFSET.] Undrilled TSU; Additional well (660) by Order 109-2009. 660' setback in spacing unit to the east.* *Exhibits indicate 1 well > 1320' lateral setback.*	☑
548-2011	Continental Resources Inc	Amend Order 274-2008 to allow 200' heel/toe setback for authorized well in overlapping temporary spacing unit comprised of 23N-56E-9: all, 10: all, 15: all, 16: all. Apply for permanent spacing within 90 days of completion. Default request.	**Continued**	*[ELM COULEE] OVERLAPPING SPACING UNIT - Language modified to reflect original order.* *Continued, email recd 12/6/2011.*	☑
549-2011	Continental Resources Inc	Amend Order 281-2008 to allow 200' heel/toe setback for authorized well in overlapping temporary spacing unit comprised of 23N-55E-3: all, 4: all, 24N-55E-33: all, 34: all. Apply for permanent spacing within 90 days of completion. Default request.	**Continued**	*[ELM COULEE] OVERLAPPING SPACING UNIT - Language modified to reflect original order.* *Continued, email recd 12/6/2011.*	☑
550-2011	Continental Resources Inc	Amend Order 284-2008 to allow 200' heel/toe setback for authorized well in overlapping temporary spacing unit comprised of 23N-55E-9: all, 10: all, 15: all, 16: all. Apply for permanent spacing within 90 days of completion. Default request.	**Continued**	*[ELM COULEE] OVERLAPPING SPACING UNIT - Language modified to reflect original order.* *Continued, email recd 12/6/2011.*	☑
551-2011	Continental Resources Inc	Amend Order 168-2007 to allow 200' north/south and 500' east/west setback in temporary spacing unit comprised of 25N-55E-18: all, 19: all and allow up to four Bakken/Three Forks Formation wells. Default request.		*[ELM COULEE] 500' Setback? Overlapping SU (17, 20, 18, 19) by Order 277-2008. (Notice should have been corrected to "heel/toe" and "lateral" setback.)*	☑
552-2011 16-2012 F	Decker Operating Company, L.L.C.	Exception to drill and produce additional well, 33N-31E-21: NE/4 and exception to drill and produce a total of four wells (one in each quarter), multiple zones, temporary spacing unit, 33N-31E-21: all, 990' setback. Default request.	**Continued**	*Continued to 2012, email rec'd 12/1/2011.*	☑
553-2011 17-2012 F	Blue Water Petroleum, LLC	Exception to drill a total of four wells, 5S-25E-22: NE/4 SW/4, 110' setback for a steam injection project. Default request.		*BLM ORDER ONLY - BLM REQUESTS THAT APPLICATION BE HEARD*	☐
554-2011 18-2012 F	Blue Water Petroleum, LLC	Temporary spacing unit, up to four wells in the Tensleep Formation, 5S-25E-22: E/2NW/4NW/4, W/2NE/4NW/4, 110' setback for a steam injection project. Default request.		*BLM ORDER ONLY - BLM REQUESTS THAT APPLICATION BE HEARD*	☐
555-2011 19-2012 F	Blue Water Petroleum, LLC	Temporary spacing unit, up to four wells, 5S-25E-10: SW/4NE/4, 21: NE/4NE/4, 110' setback for a steam injection project. Default request.		*BLM ORDER ONLY - BLM REQUESTS THAT APPLICATION BE HEARD*	☐
556-2011	TAQA North USA, Inc.	Class II saltwater disposal permit, Dakota Formation, WSW 2D (API #091-21120), 37N-58E-7: 453' FNL/717' FEL (NE/4NE/4).	**Withdrawn**	*Withdrawn, Hudak email of 11/29/2011.*	☐
557-2011	Tomahawk Oil Company, Inc.	Class II enhanced recovery permit, Tyler Formation, Stensvad 31 (API #065-05614), 11N-31E-9: 662' FSL/2091' FEL (SW/4SE/4).	**Default**		☐
558-2011	Oasis Petroleum, Inc.	Permanent spacing unit, Bakken/Three Forks Formation, 27N-58E-14: all , 23: all (Marilyn 2758 42-11H).		*TSU by Order 38-2011 (200' setback).*	☐

559-2011	Oasis Petroleum, Inc.	Temporary spacing unit, Bakken/Three Forks Formations, 26N-57E-1: all, 12: all, 200' heel/toe, 1320' lateral setbacks. Apply for permanent spacing within 90 days of completion. Default request.	**Default**		☐
560-2011	Oasis Petroleum, Inc.	Temporary spacing unit, Bakken/Three Forks Formations, 27N-58E-27: all, 28: all, 200' heel/toe, 1320' lateral setbacks. Apply for permanent spacing within 90 days of completion. Default request.		*Potential orphan 640 with Docket 568-2011 - Section 26*	☑
561-2011	Oasis Petroleum, Inc.	Amend Order 92-2011 to allow 200' heel/toe and 1320' lateral setback in temporary spacing unit comprised of 27N-57E-15: all, 22: all, Bakken/Three Forks Formation. Apply for permanent spacing within 90 days of completion. Default request.	**Continued**	*660/1320 in original order.* *Continued to 2012, fax recd 12/5/2011.*	☐
562-2011	Oasis Petroleum, Inc.	Amend Order 93-2011 to allow 200' heel/toe and 1320' lateral setback in temporary spacing unit comprised of 27N-57E-25: all, 36: all, Bakken/Three Forks Formation. Apply for permanent spacing within 90 days of completion. Default request.	**Default**	*660/1320 in original order.*	☐
563-2011	Oasis Petroleum, Inc.	Amend Order 97-2011 to allow 200' heel/toe and 1320' lateral setback in temporary spacing unit comprised of 27N-58E-30: all, 31: all, Bakken/Three Forks Formation. Apply for permanent spacing within 90 days of completion. Default request.	**Default**	*660/1320 in original order.*	☐
564-2011	Oasis Petroleum, Inc.	Amend Order 103-2010 to allow 200' heel/toe and 1320' lateral setback in temporary spacing unit comprised of 27N-59E-30: all, 31: all, Bakken/Three Forks Formation. Apply for permanent spacing within 90 days of completion. Default request.	**Default**	*660' setbacks in original order.*	☐
565-2011	Oasis Petroleum, Inc.	Amend Order 312-2010 to allow 200' heel/toe and 1320' lateral setback in temporary spacing unit comprised of 28N-58E-17: all, 20: all, Bakken/Three Forks Formation. Apply for permanent spacing within 90 days of completion. Default request.	**Default**	*660' setbacks in original order.*	☐
566-2011	Oasis Petroleum, Inc.	Temporary spacing unit, Bakken/Three Forks Formations, 29N-58E-26: all, 35: all, 200' heel/toe, 1320' lateral setbacks. Apply for permanent spacing within 90 days of completion. Default request.	**Default**		☐
567-2011	Oasis Petroleum, Inc.	Temporary spacing unit, Bakken/Three Forks Formations, 27N-59E-25: all, 26: all, 27: all, 200' heel/toe, 1320' lateral setbacks. Apply for permanent spacing within 90 days of completion. Default request.	**Continued**	*2-section + correction section; somewhat depends upon spacing unit to the south.* *Continued, email recd 12/13/2011.*	☐
568-2011	Oasis Petroleum, Inc.	Temporary spacing unit, Bakken/Three Forks Formations, 27N-58E-35: all and 26N-58E-2: all, 200' heel/toe, 1320' lateral setbacks. Apply for permanent spacing within 90 days of completion. Default request.	**Default**	*Potential orphan 640 under Docket 560-2011 - Section 26.*	☐
569-2011	Oasis Petroleum, Inc.	Temporary spacing unit, Bakken/Three Forks Formations, 27N-58E-36: all and 26N-58E-1: all, 200' heel/toe, 1320' lateral setbacks. Apply for permanent spacing within 90 days of completion. Default request.	**Default**		☐
570-2011	Bensun Energy, LLC	Rehearing of Order 177-11 and 376-2011, assessment of $5,000 fines		*[IF GRANTED, HEAR 480-2011 AFTER THIS APPLICATION.]*	☐

314-2010	Slawson Exploration Company Inc	Temporary spacing unit, Bakken Formation, 27N-59E-34: all, 35: all, 660' setback. Apply for permanent spacing within 90 days of completion.	Continued	*Requests lateral 660' setback. CORRECTION SECTIONS TO EAST ALONG BORDER NOT INCLUDED.* *Continued, fax recd 12/5/2011.*	☑
5-2011	Slawson Exploration Company Inc	Permanent spacing unit, Bakken Formation, 23N-53E-8: all (Scoundrel 1-8H).		*Drilled under statewide rule with designated TSU of all of Section 8.*	☐
6-2011	Slawson Exploration Company Inc	Pool, Bakken Formation, permanent spacing unit, 23N-53E-8: all (Scoundrel 1-8H). Non-consent penalties requested.		*Permanent spacing requested in Docket 5-2011.*	☐
11-2011 4-2011 F	Slawson Exploration Company Inc	Permanent spacing unit, Bakken Formation, 30N-59E-19: all (Mayhem 1-19H).		*Drilled under statewide rule with designated spacing unit comprised of all of Section 19.*	☐
63-2011	Brigham Oil & Gas LP	Temporary spacing unit, Bakken Formation, 25N-58E-6: all, 7: all, 1320' east/west setback, 660' north/south setback. Apply for permanent spacing within 90 days of completion. Default request.	Continued	*?? Special statewide except for noticed setback ??* *Continued, email recd 12/7/2011.*	☐
64-2011	Brigham Oil & Gas LP	Temporary spacing unit, Bakken Formation, 25N-58E-17: all, 20: all, 1320' east/west setback, 200' north/south setback. Apply for permanent spacing within 90 days of completion. Default request.	Continued	*Amended to 200' heel/toe, ltr dated 9/19/2011.* *Continued, email recd 12/7/2011.*	☐
65-2011	Brigham Oil & Gas LP	Temporary spacing unit, Bakken Formation, 25N-58E-27: all, 34: all, 1320' east/west setback, 200' north/south setback. Apply for permanent spacing within 90 days of completion. Default request.	Continued	*Continued, email recd 12/7/2011.*	☐
69-2011	Brigham Oil & Gas LP	Temporary spacing unit, Bakken Formation, 26N-57E-25: all, 36: all, 1320' east/west setback, 660' north/south setback. Apply for permanent spacing within 90 days of completion.	Continued	*?? Special statewide except for noticed setback ??* *Continued, email recd 12/7/2011.*	☐
72-2011	Brigham Oil & Gas LP	Temporary spacing unit, Bakken Formation, 26N-59E-31: all, 32: all, 1320' lateral, 200' heel/toe setback. Apply for permanent spacing within 90 days of completion.	Continued	*Amended to 200' toe/heel, ltr dated 9/15/2011.* *Continued, email recd 12/7/2011.*	☐
73-2011	Brigham Oil & Gas LP	Temporary spacing unit, Bakken Formation, 28N-56E-29: all, 32: all, 1320' lateral, 660' heel/toe setback. Apply for permanent spacing within 90 days of completion. Default request.	Continued	*?? Special statewide except for noticed setback ??* *Continued, email recd 12/7/2011.*	☐
74-2011	Brigham Oil & Gas LP	Temporary spacing unit, Bakken Formation, 28N-56E-30: all, 31: all, 1320' lateral, 200' heel/toe setback. Apply for permanent spacing within 90 days of completion. Default request.	Continued	*Amended to 200' setback, letter dated 10/17/2011.* *Continued, email recd 12/7/2011.*	☐
77-2011	Brigham Oil & Gas LP	Temporary spacing unit, Bakken Formation, 29N-55E-22: all, 27: all, 1320' lateral and 660' toe & heel setback. Apply for permanent spacing within 90 days of completion. Default request.	Continued	*?? Special statewide except for noticed setback ??* *Continued, email recd 12/7/2011.*	☐
78-2011	Brigham Oil & Gas LP	Temporary spacing unit, Bakken Formation, 29N-55E-23: all, 24: all, 1320' lateral, 660' heel/toe setback. Apply for permanent spacing within 90 days of completion. Default request.	Continued	*?? Special statewide except for noticed setback ??* *Continued, email recd 12/7/2011.*	☐
79-2011	Brigham Oil & Gas LP	Temporary spacing unit, Bakken Formation, 29N-55E-25: all, 36: all, 1320' lateral, 660' heel/toe setback. Apply for permanent spacing within 90 days of completion. Default request.	Continued	*?? Special statewide except for noticed setback ??* *Continued, email recd 12/7/2011.*	☐
80-2011	Brigham Oil & Gas LP	Temporary spacing unit, Bakken Formation, 29N-56E-17: all, 20: all, 1320' lateral, 660' heel/toe setback. Apply for permanent spacing within 90 days of completion. Default request.	Continued	*?? Special statewide except for noticed setback ??* *Continued, email recd 12/7/2011.*	☐

81-2011	Brigham Oil & Gas LP	Temporary spacing unit, Bakken Formation, 29N-56E-18: all, 19: all, 1320' lateral, 660' heel/toe setback. Apply for permanent spacing within 90 days of completion. Default request.	**Continued**	*?? Special statewide except for noticed setback ??* *Continued, email recd 12/7/2011.*	☐
82-2011	Brigham Oil & Gas LP	Temporary spacing unit, Bakken Formation, 30N-55E-33: all and 29N-55E-4: all, 1320' lateral, 660' heel/toe setback. Apply for permanent spacing within 90 days of completion. Default request.	**Continued**	*?? Special statewide except for noticed setback ??* *Continued, email recd 12/7/2011.*	☐
83-2011	Brigham Oil & Gas LP	Temporary spacing unit, Bakken Formation, 30N-55E-34: all and 29N-55E-3: all, 1320' lateral, 660' heel/toe setback. Apply for permanent spacing within 90 days of completion. Default request.	**Continued**	*?? Special statewide except for noticed setback ??* *Continued, email recd 12/7/2011.*	☐
155-2011	Abraxas Petroleum Corporation	Temporary spacing unit, two Bakken Formation wells with a common pad, 24N-59E-1: all, 12: all, 13: all, 660' setback. Apply for permanent spacing within 90 days of completion.		*660' setback requested.*	☐
156-2011	Abraxas Petroleum Corporation	Temporary spacing unit, two Bakken Formation wells with a common pad, 24N-60E-6: all, 7: all, 18: all, 660' setback. Apply for permanent spacing within 90 days of completion.		*660' setback requested.*	☐
157-2011	Abraxas Petroleum Corporation	Temporary spacing unit, two Bakken Formation wells with a common pad, 24N-60E-17: all, 20: all, 660' setback. Apply for permanent spacing within 90 days of completion.		*660' setback requested.*	☐
178-2011	Continental Resources Inc	Exception to drill up to four wells, Bakken/Three Forks Formation, permanent spacing unit, 26N-53E-1: all, 12: all, 200' north/south setback, 500' east/west setback (if not approved, 660' setback).	**Continued**	*PSU (Bakken/Three Forks) by Order 130-2011.* *Continued, email recd 12/6/2011.*	☐
179-2011	Continental Resources Inc	Exception to drill up to fourwells, Bakken/Three Forks Formation, permanent spacing unit, 25N-54E-6: all, 26N-54E-31: all, 200' north/south setback, 500' east/west setback (if not approved as requested, 660' setback).	**Continued**	*Elm Coulee Area; PSU by Order 129-2011.* *660' offsets to south, east, and west.* *Continued, email recd 12/6/2011.*	☐
180-2011	Continental Resources Inc	Exception to drill up to four wells, Bakken/Three Forks Formation, permanent spacing unit, 26N-56E-5: all, 8: all, 200' north/south setback, 500' east/west setback (if not approved approved as requested, 660' setback).	**Continued**	*PSU (Bakken/Three Forks) by Order 131-2011.* *Continued, email recd 12/6/2011.*	☐
240-2011	Brigham Oil & Gas LP	Pool, Bakken Formation, permanent spacing unit, 28N-57E-8: all, 17: all (Gobbs 17-8 #1-H). Non-joinder penalties requested.		*PSU by Order 193-2011.*	☐
242-2011	Brigham Oil & Gas LP	Pool, Bakken Formation, permanent spacing unit, 26N-59E-19: all, 30: all (Johnson 30-19 #1H). Non-joinder penalties requested.		*PSU by Order 65-2011.*	☐
296-2011	Mountain View Energy, Inc.	Temporary spacing unit, Bakken Formation, 33N-58E-6: all, 7: all, 1320' lateral, 660' heel/toe setback. Apply for permanent spacing within 90 days of completion. Default request.		*?? Special statewide except for noticed setback ??*	☐
299-2011	Central Montana Resources, LLC	Permanent spacing, Heath Formation, 13N-28E-15: all (Shadowfax 1B).	**Continued**	*Temporary spacing by Order 167-2010.* *Continued, fax recd 12/5/2011.*	☐
302-2011	G3 Operating, LLC	Exception to drill additional well, Duperow Formation, permanent spacing unit, 24N-58E-13: S/2NW/4, N/2SW/4. Well to be located 1980' FSL/1980' FWL.		*S/2 NW/4 and N/2 SW/4 designated a Duperow spacing unit by Order 72-1999.* *Continued to December at hearing.*	☐

322-2011	Whiting Oil and Gas Corporation	Temporary spacing unit, Bakken/Three Forks Formations, 31N-57E-16: all, 21: all, 660' heel/toe, 1320' lateral setbacks. Apply for permanent spacing within 90 days of completion. Default w/ auto continuance requested.	**Withdrawn**	*Letter of protest - Steven Schmitz (emailed, 12/7/2011 to confirm protest.)* *Withdrawn, fax recd 12/8/2011.* *?? Special statewide except for noticed setback ??*	☐
334-2011 20-2012 F	Samson Resources Company	Temporary spacing unit, Bakken/Three Forks Formations, 33N-56E-6: all, 7: all, 200' heel/toe, 1320' lateral setbacks. Apply for permanent spacing within 90 days of completion. Default requested.	**Default**	*Ltr of support, Fort Peck Energy Company*	☐
335-2011	Samson Resources Company	Temporary spacing unit, Bakken/Three Forks Formations, 35N-58E-2: all, 11: all, 200' heel/toe, 1320' lateral setbacks. Apply for permanent spacing within 90 days of completion. Default requested.	**Continued**	*Continued to 2012, fax recd 12/5/2011.*	☐
336-2011	Samson Resources Company	Temporary spacing unit, Bakken/Three Forks Formations, 35N-56E-15: all, 22: all, 200' heel/toe, 1320' lateral setbacks. Apply for permanent spacing within 90 days of completion. Default requested.	**Default**		☐
342-2011	Fidelity Exploration & Production Co.	Temporary spacing unit, Bakken/Three Forks Formations, 22N-57E-8: all, 17: all, 200' heel/toe, 1320' lateral setbacks. Apply for permanent spacing within 90 days of completion. Default request.		*660' offset heel/toe; orphan tract.*	☑
355-2011	Continental Resources Inc	Overlapping temporary spacing unit, Bakken/Three Forks Formations, 25N-54E-4: all, 5: all, 200' heel/toe, 1320' lateral setbacks. Apply for permanent spacing within 90 days of completion. Default request.	**Continued**	*?? Includes 640 with existing tri-lateral; 1320' setback ??* *-- Gary Amestoy - protest. Continued, email recd 12/6/2011.*	☑
356-2011	Continental Resources Inc	Overlapping temporary spacing unit, Bakken/Three Forks Formations, 26N-52E-27: all, 34:all, 200' heel/toe, 1320' lateral setbacks. Apply for permanent spacing within 90 days of completion. Default request.	**Continued**	*?? Includes 640 with existing tri-lateral; 1320' setback ??* *-- Fisher protest. Continued, email recd 12/6/2011.*	☑
357-2011	Continental Resources Inc	Temporary spacing unit, Bakken/Three Forks Formations, 23N-53E-12: all, 13: all, 200' heel/toe, 1320' lateral setbacks. Apply for permanent spacing within 90 days of completion.		*?? Permanent spacing units, 660 setback to north and east. ??*	☑
387-2011	EOG Resources, Inc.	Permanent spacing unit, Bakken Formation, 26N-54E-32: all, 33: all (Therese 2-32H).		*Elm Coulee Area; overlapping TSU by Order 126-2009.* *Continued, noitice, telephone call 10/12/2011*	☐
392-2011	Slawson Exploration Company Inc	Class II saltwater disposal permit, Muddy Formation, Verschoot 1-19 (API #083-21866), 23N-54E-19: 2075' FSL/696' FWL (NW/4SW/4).	**Default**		☐
393-2011	Slawson Exploration Company Inc	Class II saltwater disposal permit, Muddy/Dakota Formations, Ulman 1-20 (API #083-21364), 20N-60E-20: 1980' FSL/1980' FEL (NW/4SE/4).	**Default**		☐
394-2011	TOI Operating	Class II saltwater disposal permit, Dakota Formation, Wojahn A 5-2 (API #109-21041), 13N-60E-2: 2576' FNL/660' FWL (SW/4NW/4).	**Continued**	*Continued, Hudak email of 11/29/2011.*	☐
403-2011	Sands Oil Company	Class II saltwater disposal permit, Rierdon/Madison Formation, Sprague 12-21 (API #073-21745), 28N-5W-21: 1980' FSL/660' FWL (NW/4SW/4).	**Continued**	*Continued, Hudak email of 11/29/2011.*	☐

404-2011	Brigham Oil & Gas LP	Vacate Order 172-2010 that created a TSU of 25N-59E-13 & 24. Establish new temporary spacing unit, Bakken/Three Forks Formations, 25N-59E-12: all, 13: all, 200' heel/toe, 1320' side setbacks. Apply for permanent spacing within 90 days of completion.	**Continued**	*1320' side setbacks might be impossible - total width less than 2640'.* *Continued, email recd 12/7/2011.* *-- Along North Dakota Border so 500' setback reasonable.*	☑
405-2011	Brigham Oil & Gas LP	Vacate Order 172-2010 that created a TSU of 25N-59E-13 & 24. Establish new temporary spacing unit, Bakken/Three Forks Formations, 25N-59E-23: all, 24: all, 200' heel/toe, 1320' side setbacks. Apply for permanent spacing within 90 days of completion.	**Continued**	*-- Along North Dakota Border so 500' setback reasonable.* *Continued, email recd 12/7/2011.*	☐
409-2011	Brigham Oil & Gas LP	Amend Board Order 302-2010 (TSU, 26N-57E-15, 22) to allow 200' heel/toe, 1320' side setbacks in temporary spacing unit, Bakken/Three Forks Formation. Apply for permanent spacing within 90 days of completion. Default request.	**Continued**	*660' setbacks, Bakken in original order.* *Continued, email recd 12/7/2011.*	☐
410-2011	Brigham Oil & Gas LP	Amend Board Order 277-2010 (TSU, 26N-59E-17, 18) to allow 200' heel/toe, 1320' side setbacks in temporary spacing unit, Bakken/Three Forks Formation. Apply for permanent spacing within 90 days of completion. Default request.	**Continued**	*660' setbacks, Bakken in original order.* *Continued, email recd 12/7/2011.*	☐
411-2011	Brigham Oil & Gas LP	Amend Board Order 61-2010 (TSU, 28N-55E-14, 23) to allow 200' heel/toe, 1320' side setbacks in temporary spacing unit, Bakken/Three Forks Formation. Apply for permanent spacing within 90 days of completion. Default request.	**Continued**	*660' setbacks, Bakken in original order.* *Continued, email recd 12/7/2011.*	☐
416-2011 11-2011 F	Brigham Oil & Gas LP	Amend Board Order 31-2011 (TSU, 28N-57E-1, 12) to allow 200' heel/toe, 1320' side setbacks in temporary spacing unit, Bakken/Three Forks Formation. Apply for permanent spacing within 90 days of completion. Default request.	**Default**	*1320/660' setbacks, Bakken in original order.* *Increased well density requested in 514-2011.*	☐
418-2011 14-2011 F	Brigham Oil & Gas LP	Amend Board Order 35-2011 to allow 200' heel/toe, 1320' side setbacks in temporary spacing unit, Bakken/Three Forks Formation. Apply for permanent spacing within 90 days of completion. Default request.	**Default**	*1320/660' setbacks, Bakken by original order.* *Increased well density requested in Docket 515-2011.*	☐
420-2011	Brigham Oil & Gas LP	Amend Board Order 47-2010 (TSU, 28N-59E-5, 8) to allow 200' heel/toe, 1320' side setbacks in temporary spacing unit, Bakken/Three Forks Formation. Apply for permanent spacing within 90 days of completion. Default request.	**Continued**	*660' setbacks, Bakken in original order.* *Continued, email recd 12/7/2011.*	☐
421-2011	Brigham Oil & Gas LP	Amend Board Order 49-2010 (TSU, 28N-59E-17, 20) to allow 200' heel/toe, 1320' side setbacks in temporary spacing unit, Bakken/Three Forks Formation. Apply for permanent spacing within 90 days of completion. Default request.	**Default**	*660' setbacks, Bakken in original order.*	☐
422-2011	Brigham Oil & Gas LP	Amend Board Order 50-2010 (TSU, 28N-59E-18, 19) to allow 200' heel/toe, 1320' side setbacks in temporary spacing unit, Bakken/Three Forks Formation. Apply for permanent spacing within 90 days of completion. Default request.	**Continued**	*660' setbacks, Bakken in original order.* *Continued, email recd 12/7/2011.*	☐
424-2011	Brigham Oil & Gas LP	Temporary spacing unit, Bakken/Three Forks Formations, 25N-58E-14: all, 23: all, 200' heel/toe, 1320' side setbacks. Apply for permanent spacing within 90 days of completion. Default request.	**Default**		☐
426-2011	Brigham Oil & Gas LP	Temporary spacing unit, Bakken/Three Forks Formations, 26N-57E-5: all, 8: all, 200' heel/toe, 1320' side setbacks. Apply for permanent spacing within 90 days of completion. Default request.	**Continued**	*Continued, email recd 12/7/2011.*	☐

427-2011	Brigham Oil & Gas LP	Temporary spacing unit, Bakken/Three Forks Formations, 26N-57E-17: all, 20: all, 200' heel/toe, 1320' side setbacks. Apply for permanent spacing within 90 days of completion. Default request.	**Continued**	*Continued, email recd 12/7/2011.*	☐
429-2011	Brigham Oil & Gas LP	Temporary spacing unit, Bakken/Three Forks Formations, 27N-57E-5: all, 8: all, 200' heel/toe, 1320' side setbacks. Apply for permanent spacing within 90 days of completion. Default request.	**Continued**	*Continued, email recd 12/7/2011.*	☐
430-2011 10-2012 F	Brigham Oil & Gas LP	Temporary spacing unit, Bakken/Three Forks Formations, 27N-57E-6: all, 7: all, 200' heel/toe, 1320' side setbacks. Apply for permanent spacing within 90 days of completion. Default request.	**Default**	*Increased well density, Docket 513-2011.*	☐
432-2011	Brigham Oil & Gas LP	Temporary spacing unit, Bakken/Three Forks Formations, 28N-55E-15: all, 22: all, 200' heel/toe, 1320' side setbacks. Apply for permanent spacing within 90 days of completion.	**Continued**	*Continued, email recd 12/7/2011.*	☐
434-2011	Brigham Oil & Gas LP	Exception to drill up to four Bakken/Three Forks wells, temporary spacing unit, 25N-59E-3: all, 10: all, 200' toe/heel, 500' side setback. First well to be 1320' from side boundary. Default request.		*TSU (660' setbacks) by Order 220-2010, no wells drilled.*	☑
435-2011	Brigham Oil & Gas LP	Exception to drill up to four Bakken/Three Forks wells, permanent spacing unit, 25N-59E-11: all, 14: all, 200' toe/heel, 500' side setback. Default request.		*Permanently spaced (BAKKEN) by Order 338-2007 (Marathon)* *?? Vacate Orders 66-2011 & 192-2011 - 660' side, 200' toe/heel setbacks for one additional well. ??*	☑
436-2011	Brigham Oil & Gas LP	Exception to drill up to four Bakken/Three Forks wells, temporary spacing unit, 25N-59E-15: all, 22: all, 200' toe/heel, 500' side setback. First well to be 1320' from side boundary. Default request.		*TSU (660 setbacks) by Order 45-2007, no wells drilled.*	☑
437-2011	Brigham Oil & Gas LP	Exception to drill up to four Bakken/Three Forks wells, temporary spacing unit, 25N-59E-25: all, 26: all, 35: all, 36: all, 200' toe/heel, 500' side setback. First well to be 1320' from side boundary Default request.		*TSU (1320/200 setbacks) by Order 188-2011; no wells drilled.*	☑
438-2011	Brigham Oil & Gas LP	Exception to drill up to four Bakken/Three Forks wells, permanent spacing unit, 26N-59E-35: all, 36: all and 25N-59E-1: all, 2: all, 200' toe/heel, 500' side setback. First well to be 1320' from side boundary Default request.		*TSU (1320/200 setbacks) by Order 189-2011, no wells drilled.*	☑
439-2011	Brigham Oil & Gas LP	Exception to drill up to four Bakken/Three Forks wells, spacing unit, 26N-59E-6: all, 7: all, 200' toe/heel, 500' side setback. Default request.		*TSU by Order 146-2010; initial well drilled under 660' setback requirement.* *?? WELL COMPLETED - FIRST PRODUCTION REPORTED DURING JULY ??*	☑
441-2011	Brigham Oil & Gas LP	Exception to drill up to four Bakken/Three Forks wells, permanent spacing unit, 26N-59E-19: all, 30: all, 200' toe/heel, 500' side setback. Default request.		*BAKKEN PSU by Order 65-2011; BAKKEN pooling requested under continued Docket 242-2011.*	☐
444-2011	Brigham Oil & Gas LP	Pool, permanent spacing unit, Bakken Formation, 25N-58E-28: all, 33: all (Glenn 28-33 #1H). Non-joinder penalties requested.	**Continued**	*?? Include Three Forks ??* *Permanent spacing, Bakken / Three Forks by Order 347-2011.* *Continued, ltr recd 12/12/2011.*	☐
445-2011	Brigham Oil & Gas LP	Permanent spacing unit, Bakken Formation, 29N-55E-10: all, 15: all (Beck 15-10 #1-H).		*?? Include Three Forks ?? (Notice?)*	☐

446-2011	Brigham Oil & Gas LP	Pool, permanent spacing unit, Bakken Formation, 29N-55E-10: all, 15: all (Beck 15-10 #1-H). Non-joinder penalties requested.	**Continued**	*?? Include Three Forks ?? (See prior docket.) Continued, ltr recd 12/12/2011.*	☐
450-2011 5-2012 F	Mountain View Energy, Inc.	Temporary spacing unit, Bakken Formation, 33N-58E-27: all, 34: all, 200' heel/toe, 1320' lateral setback. Apply for permanent spacing within 90 days of completion.	**Default**		☐
452-2011	Slawson Exploration Company Inc	Permanent spacing unit, Bakken Formation, 26N-59E-3: all (Battalion 1-3H).		*Drilled under statewide 640-acre TSU. (Pooling, Docket 453-2011)*	☐
453-2011	Slawson Exploration Company Inc	Pool, permanent spacing unit, Bakken Formation, 26N-59E-3: all (Battalion 1-3H).		*Spacing, Docket 452-2011.*	☐
571-2011	Zimmerman, Brent	Show cause, bond forfeiture			☐
572-2011	Athena Energy LLC	Show cause, immediately plug and abandon wells if satisfactory plugging plan is not received by 12-15-11.			☐

EXHIBIT 4

Default Docket, 12/15/2011

463-2011	Fidelity Exploration & Production Co.	Default	Temp. Spacing
465-2011	Fidelity Exploration & Production Co.	Default	Temp. Spacing
470-2011	XTO Energy Inc.	Default	Spacing Amendment
471-2011	XTO Energy Inc.	Default	Spacing Amendment
474-2011	Marathon Oil Company	Default	Temp. Spacing
475-2011	Marathon Oil Company	Default	Temp. Spacing
476-2011	Marathon Oil Company	Default	Spacing Amendment
477-2011	Marathon Oil Company	Default	Spacing Amendment
478-2011	Marathon Oil Company	Default	Spacing Amendment
481-2011	Energy Corporation of America	Default	Class II Permit
484-2011	TAQA North USA, Inc.	Default	Well Density
485-2011	TAQA North USA, Inc.	Default	Well Density
486-2011	TAQA North USA, Inc.	Default	Well Density
506-2011	Brigham Oil & Gas LP	Default	Temp. Spacing
507-2011	Brigham Oil & Gas LP	Default	Spacing Amendment
534-2011	Continental Resources Inc	Default	Spacing Amendment
542-2011	Continental Resources Inc	Default	Temp. Spacing
557-2011	Tomahawk Oil Company, Inc.	Default	Class II Permit
559-2011	Oasis Petroleum, Inc.	Default	Temp. Spacing
562-2011	Oasis Petroleum, Inc.	Default	Spacing Amendment
563-2011	Oasis Petroleum, Inc.	Default	Spacing Amendment
564-2011	Oasis Petroleum, Inc.	Default	Spacing Amendment
565-2011	Oasis Petroleum, Inc.	Default	Spacing Amendment
566-2011	Oasis Petroleum, Inc.	Default	Temp. Spacing
568-2011	Oasis Petroleum, Inc.	Default	Temp. Spacing
569-2011	Oasis Petroleum, Inc.	Default	Temp. Spacing
334-2011	Samson Resources Company	Default	Temp. Spacing
336-2011	Samson Resources Company	Default	Temp. Spacing
392-2011	Slawson Exploration Company Inc	Default	Class II Permit
393-2011	Slawson Exploration Company Inc	Default	Class II Permit
416-2011	Brigham Oil & Gas LP	Default	Spacing Amendment
418-2011	Brigham Oil & Gas LP	Default	Spacing Amendment
421-2011	Brigham Oil & Gas LP	Default	Spacing Amendment
424-2011	Brigham Oil & Gas LP	Default	Temp. Spacing
430-2011	Brigham Oil & Gas LP	Default	Temp. Spacing
450-2011	Mountain View Energy, Inc.	Default	Temp. Spacing

Exhibit 5

Applications to Hear, 12/15/2011

462-2011	Montana Board of Oil & Gas		Other
466-2011	Fidelity Exploration & Production Co.		Temp. Spacing
467-2011	Fidelity Exploration & Production Co.		Temp. Spacing
468-2011	Whiting Oil and Gas Corporation		Re-hearing
469-2011	Primary Petroleum Company USA, Inc.	Protested	Protest
472-2011	XTO Energy Inc.		Pooling
473-2011	XTO Energy Inc.		Pooling
480-2011	Bensun Energy, LLC		Class II Permit
482-2011	TAQA North USA, Inc.		Spacing
483-2011	TAQA North USA, Inc.		Spacing
488-2011	G3 Operating, LLC		Temp. Spacing
489-2011	Topaz Oil & Gas Inc		Spacing
490-2011	NFR Bear Paw Basin, LLC		Spacing, Vacate Field/Rule
491-2011	Whiting Oil and Gas Corporation		Temp. Spacing
492-2011	Whiting Oil and Gas Corporation		Spacing Amendment
493-2011	Whiting Oil and Gas Corporation		Spacing Amendment
494-2011	Whiting Oil and Gas Corporation		Spacing Amendment
495-2011	Whiting Oil and Gas Corporation		Temp. Spacing
496-2011	Whiting Oil and Gas Corporation		Temp. Spacing
497-2011	Whiting Oil and Gas Corporation		Temp. Spacing
498-2011	Whiting Oil and Gas Corporation		Temp. Spacing
499-2011	Whiting Oil and Gas Corporation		Temp. Spacing
500-2011	Whiting Oil and Gas Corporation		Temp. Spacing
501-2011	Whiting Oil and Gas Corporation		Temp. Spacing
504-2011	Whiting Oil and Gas Corporation		Temp. Spacing
510-2011	Brigham Oil & Gas LP		Well Density
512-2011	Brigham Oil & Gas LP		Well Density
513-2011	Brigham Oil & Gas LP		Well Density
514-2011	Brigham Oil & Gas LP		Well Density
515-2011	Brigham Oil & Gas LP		Well Density
516-2011	Brigham Oil & Gas LP		Well Density
517-2011	Brigham Oil & Gas LP		Well Density
519-2011	Continental Resources Inc		Spacing Amendment
520-2011	Continental Resources Inc		Vacate Field/Rule
521-2011	Continental Resources Inc		Temp. Spacing
523-2011	Continental Resources Inc		Spacing Amendment
524-2011	Continental Resources Inc		Spacing Amendment
525-2011	Continental Resources Inc		Spacing Amendment
526-2011	Continental Resources Inc		Spacing Amendment
536-2011	Continental Resources Inc		Spacing Amendment
538-2011	Continental Resources Inc		Temp. Spacing
541-2011	Continental Resources Inc		Spacing Amendment
544-2011	Continental Resources Inc		Spacing
545-2011	Continental Resources Inc		Pooling
547-2011	Continental Resources Inc		Spacing Amendment

551-2011	Continental Resources Inc	Spacing Amendment
553-2011	Blue Water Petroleum, LLC	Exception - Drilling
554-2011	Blue Water Petroleum, LLC	Temp. Spacing
555-2011	Blue Water Petroleum, LLC	Temp. Spacing
558-2011	Oasis Petroleum, Inc.	Spacing
560-2011	Oasis Petroleum, Inc.	Temp. Spacing
570-2011	Bensun Energy, LLC	Re-hearing
5-2011	Slawson Exploration Company Inc	Spacing
6-2011	Slawson Exploration Company Inc	Pooling
11-2011	Slawson Exploration Company Inc	Spacing
155-2011	Abraxas Petroleum Corporation	Temp. Spacing
156-2011	Abraxas Petroleum Corporation	Temp. Spacing
157-2011	Abraxas Petroleum Corporation	Temp. Spacing
240-2011	Brigham Oil & Gas LP	Pooling
242-2011	Brigham Oil & Gas LP	Pooling
296-2011	Mountain View Energy, Inc.	Temp. Spacing
302-2011	G3 Operating, LLC	Well Density
342-2011	Fidelity Exploration & Production Co.	Temp. Spacing
357-2011	Continental Resources Inc	Temp. Spacing
387-2011	EOG Resources, Inc.	Spacing
434-2011	Brigham Oil & Gas LP	Well Density
435-2011	Brigham Oil & Gas LP	Well Density
436-2011	Brigham Oil & Gas LP	Well Density
437-2011	Brigham Oil & Gas LP	Well Density
438-2011	Brigham Oil & Gas LP	Well Density
439-2011	Brigham Oil & Gas LP	Well Density
441-2011	Brigham Oil & Gas LP	Well Density
445-2011	Brigham Oil & Gas LP	Spacing
452-2011	Slawson Exploration Company Inc	Spacing
453-2011	Slawson Exploration Company Inc	Pooling
571-2011	Zimmerman, Brent	Show-Cause
572-2011	Athena Energy LLC	Show-Cause

Applications Consistent With Proposed Statewide Rule (58)

G1	Default	XTO Energy Inc.	470-2011	Lee, John
G1	Default	XTO Energy Inc.	471-2011	Lee, John
G1	Default	Marathon Oil Company	474-2011	Lee, John
G1	Default	Marathon Oil Company	475-2011	Lee, John
G1	Default	Marathon Oil Company	476-2011	Lee, John
G1	Default	Marathon Oil Company	477-2011	Lee, John
G1	Default	Marathon Oil Company	478-2011	Lee, John
G1		G3 Operating, LLC	488-2011	O'Toole, Larry
G1		Whiting Oil and Gas Corporation	491-2011	Lee, John
G1	Continued	Brigham Oil & Gas LP	505-2011	Gray, Scotti
G1	Default	Brigham Oil & Gas LP	506-2011	Gray, Scotti
G1	Default	Brigham Oil & Gas LP	507-2011	Gray, Scotti
G1	Continued	Brigham Oil & Gas LP	508-2011	Gray, Scotti
G1	Continued	Continental Resources Inc	533-2011	Lee, Don
G1	Default	Continental Resources Inc	534-2011	Lee, Don
G1	Continued	Continental Resources Inc	535-2011	Lee, Don
G1		Continental Resources Inc	536-2011	Lee, Don
G1	Continued	Continental Resources Inc	537-2011	Lee, Don
G1	Continued	Continental Resources Inc	539-2011	Lee, Don
G1	Continued	Continental Resources Inc	540-2011	Lee, Don
G1		Continental Resources Inc	541-2011	Lee, Don
G1	Default	Continental Resources Inc	542-2011	Lee, Don
G1	Default	Oasis Petroleum, Inc.	559-2011	Lee, John
G1	Continued	Oasis Petroleum, Inc.	561-2011	Lee, John
G1	Default	Oasis Petroleum, Inc.	562-2011	Lee, John
G1	Default	Oasis Petroleum, Inc.	563-2011	Lee, John
G1	Default	Oasis Petroleum, Inc.	564-2011	Lee, John
G1	Default	Oasis Petroleum, Inc.	565-2011	Lee, John
G1	Default	Oasis Petroleum, Inc.	566-2011	Lee, John
G1	Default	Oasis Petroleum, Inc.	569-2011	Lee, John
G1	Continued	Brigham Oil & Gas LP	63-2011	Gray, Scotti
G1	Continued	Brigham Oil & Gas LP	64-2011	Gray, Scotti
G1	Continued	Brigham Oil & Gas LP	65-2011	Gray, Scotti
G1	Continued	Brigham Oil & Gas LP	69-2011	Gray, Scotti
G1	Continued	Brigham Oil & Gas LP	72-2011	Gray, Scotti
G1	Continued	Brigham Oil & Gas LP	73-2011	Gray, Scotti
G1	Continued	Brigham Oil & Gas LP	74-2011	Gray, Scotti
G1	Continued	Brigham Oil & Gas LP	77-2011	Gray, Scotti
G1		Mountain View Energy, Inc.	296-2011	O'Toole, Larry
G1	Withdrawn	Whiting Oil and Gas Corporation	322-2011	Lee, John
G1	Default	Samson Resources Company	334-2011	Lee, John
G1	Continued	Samson Resources Company	335-2011	Lee, John
G1	Default	Samson Resources Company	336-2011	Lee, John
G1	Continued	Brigham Oil & Gas LP	409-2011	Gray, Scotti
G1	Continued	Brigham Oil & Gas LP	410-2011	Gray, Scotti

G1	Continued	Brigham Oil & Gas LP	411-2011	Gray, Scotti
G1	Default	Brigham Oil & Gas LP	416-2011	Gray, Scotti
G1	Default	Brigham Oil & Gas LP	418-2011	Gray, Scotti
G1	Continued	Brigham Oil & Gas LP	420-2011	Gray, Scotti
G1	Default	Brigham Oil & Gas LP	421-2011	Gray, Scotti
G1	Continued	Brigham Oil & Gas LP	422-2011	Gray, Scotti
G1	Default	Brigham Oil & Gas LP	424-2011	Gray, Scotti
G1	Continued	Brigham Oil & Gas LP	426-2011	Gray, Scotti
G1	Continued	Brigham Oil & Gas LP	427-2011	Gray, Scotti
G1	Continued	Brigham Oil & Gas LP	429-2011	Gray, Scotti
G1	Default	Brigham Oil & Gas LP	430-2011	Gray, Scotti
G1	Continued	Brigham Oil & Gas LP	432-2011	Gray, Scotti
G1	Default	Mountain View Energy, Inc.	450-2011	O'Toole, Larry

Designation of Spacing Units With Additional Wells (8)

G2		Whiting Oil and Gas Corporation	495-2011	Lee, John
G2		Whiting Oil and Gas Corporation	496-2011	Lee, John
G2		Whiting Oil and Gas Corporation	497-2011	Lee, John
G2		Whiting Oil and Gas Corporation	498-2011	Lee, John
G2		Whiting Oil and Gas Corporation	499-2011	Lee, John
G2		Whiting Oil and Gas Corporation	500-2011	Lee, John
G2		Whiting Oil and Gas Corporation	501-2011	Lee, John
G2		Whiting Oil and Gas Corporation	504-2011	Lee, John

82-11-201. ***(Temporary)*** **Establishment of well spacing units.** (1) To prevent or to assist in preventing waste of oil or gas prohibited by this chapter, to avoid the drilling of unnecessary wells, or to protect correlative rights, the board, upon its own motion or upon application of an interested person, after hearing, may by order establish:

(a) temporary spacing units on a statewide basis or for defined areas within the state for oil, gas, or oil and gas wells drilled to varying depths; and

(b) permanent spacing units for a discovered pool, except in those pools that, prior to April 1, 1953, have been developed to such an extent that it would be impracticable or unreasonable to establish spacing units at the existing stage of development.

(2) The size and the shape of temporary spacing units must be established to promote the orderly development of unproven areas and must be uniform throughout the surface area and depths covered by the unit. A temporary spacing unit must remain in effect until superseded by an order issued by the board or until a permanent spacing unit is established.

(3) Permanent spacing units do not need to be uniform in size or shape but must result in the efficient and economic development of the pool as a whole. In establishing permanent spacing units, the acreage to be embraced within a unit and the shape of the unit must be determined by the board based upon evidence introduced at the hearing. The board may divide a pool into zones and establish spacing units for each zone if necessary for a purpose mentioned in subsection (1) or to facilitate production through the use of innovative drilling and completion methods. The spacing units within the zone may differ in size and shape from spacing units in any other zone but may not be smaller than the maximum area that can be efficiently and economically drained by one well.

(4) An order establishing temporary or permanent spacing units may permit only one well to be drilled and produced from the common source of supply on any spacing unit. The well must be drilled at a location authorized by the order, with an exception as may be reasonably necessary. The well location exception may be included in the request to establish permanent or temporary spacing units if, upon application, notice, and hearing, the board finds that the spacing unit is located on the edge of a pool or field and adjacent to a producing unit or, for some other reason, that the requirement to drill the well at the authorized location on the spacing unit would be inequitable or unreasonable. The board shall take action to offset any advantage that the person securing the exception may have over other producers by reason of drilling the well as an exception. The order must include provisions to prevent production from the spacing unit from being more than its just and equitable share of the producible oil and gas in the pool.

(5) An order establishing temporary or permanent spacing units for a pool must cover all lands determined or believed to be underlaid by the pool and may be modified after notice and hearing by the board to include additional areas subsequently determined to be underlaid by the pool.

(6) The board, upon application, notice, and hearing, may increase or decrease the size of a temporary or permanent spacing unit or permit the drilling of additional wells in a spacing unit for a purpose mentioned in subsection (1).

Requests for Additional Wells in Undrilled Temporary Spacing Units (17)

G3		Whiting Oil and Gas Corporation	492-2011	Lee, John
G3		Whiting Oil and Gas Corporation	493-2011	Lee, John
G3		Whiting Oil and Gas Corporation	494-2011	Lee, John
G3	Withdrawn	Whiting Oil and Gas Corporation	502-2011	Lee, John
G3	Continued	Whiting Oil and Gas Corporation	503-2011	Lee, John
G3	Continued	Brigham Oil & Gas LP	509-2011	Gray, Scotti
G3		Brigham Oil & Gas LP	510-2011	Gray, Scotti
G3	Continued	Brigham Oil & Gas LP	511-2011	Gray, Scotti
G3		Brigham Oil & Gas LP	512-2011	Gray, Scotti
G3		Brigham Oil & Gas LP	513-2011	Gray, Scotti
G3		Brigham Oil & Gas LP	514-2011	Gray, Scotti
G3		Brigham Oil & Gas LP	515-2011	Gray, Scotti
G3		Brigham Oil & Gas LP	516-2011	Gray, Scotti
G3		Continental Resources Inc	547-2011	Lee, Don
G3		Brigham Oil & Gas LP	434-2011	Gray, Scotti
G3		Brigham Oil & Gas LP	436-2011	Gray, Scotti
G3		Brigham Oil & Gas LP	437-2011	Gray, Scotti

Requests for Additional Wells in Drilled Temporary Spacing Units (1)

G4		Brigham Oil & Gas LP	439-2011	Gray, Scotti

Requests for 200' and/or 500' Setbacks in Elm Coulee Area (19)

G5	Continued	Continental Resources Inc	518-2011	Lee, Don
G5		Continental Resources Inc	519-2011	Lee, Don
G5	Continued	Continental Resources Inc	522-2011	Lee, Don
G5		Continental Resources Inc	523-2011	Lee, Don
G5		Continental Resources Inc	524-2011	Lee, Don
G5		Continental Resources Inc	525-2011	Lee, Don
G5		Continental Resources Inc	526-2011	Lee, Don
G5	Continued	Continental Resources Inc	527-2011	Lee, Don
G5	Continued	Continental Resources Inc	528-2011	Lee, Don
G5	Continued	Continental Resources Inc	529-2011	Lee, Don
G5	Continued	Continental Resources Inc	530-2011	Lee, Don
G5	Continued	Continental Resources Inc	531-2011	Lee, Don
G5	Continued	Continental Resources Inc	532-2011	Lee, Don
G5		Continental Resources Inc	551-2011	Lee, Don
G5	Continued	Continental Resources Inc	179-2011	Lee, Don
G5		Continental Resources Inc	357-2011	Lee, Don
G6	Continued	Continental Resources Inc	548-2011	Lee, Don
G6	Continued	Continental Resources Inc	549-2011	Lee, Don
G6	Continued	Continental Resources Inc	550-2011	Lee, Don

Name of Organization:

Montana Tech
1300 W. Park Street
Butte, MT 59701

Title of Proposed Project:

Constructing a Combustion Tube Apparatus to Study In-Situ Combustion of Heavy Crude Oil including Toe Heel Air Injection, Shallow Reservoirs and Solvent and Catalyst Enhancements

Requested Amount: $500,000
Project Duration: 24 months

PI Name: Susan M. Schrader
Department: Petroleum Engineering
High Degree: Ph.D.
Year of Degree: 2004
Telephone Number (406) 496-4796
Email: sschrader@mtech.edu

Co-PI Name: Richard J. Schrader
Department: Petroleum Engineering
High Degree: B.S.
Year of Degree: 1985
Telephone Number (406) 491-1489
Email: rschrader@mtech.edu

Project Summary

Intellectual merit

This proposal is to request funding to build a combustion tube apparatus to study in-situ combustion of heavy oil. In-situ combustion is a promising technique in the area of heavy oil recovery. Heavy oils are dense, viscous crudes that do not flow easily and cannot be produced by conventional means. In-situ combustion remedies this by using heat to lower the viscosity of the oil and break the long hydrocarbon chains. Through burning the heavy residuals, lighter, upgraded oil is produced. In-situ combustion has been used in the oilfield and improvements of the method are currently being studied.

The combustion tube setup we are proposing would allow properties of the upgraded oil, temperatures, rates of growth of heated areas and properties of effluent gasses to be measured. This instrumentation grant would allow for the construction, testing and application of a versatile in-situ combustion tube apparatus, with precise mass flow control, heat control, thermal imaging equipment, gas chromatography and various tube set-ups. It will be used in conjunction with a newly developed simulation model and when completed will help tune the simulator. The combination of lab apparatus and computer simulation will be an effective tool to study in-situ combustion and propose new enhancements to the process.

Broader impact

Montana Tech is in a good position to study heavy oil recovery. US reserves of heavy crude are nearby, and with our transfer agreement with two Alberta schools, many students arrive at Tech with a strong interest in working with heavy oil. The undergraduate class in Thermal Recovery is very popular, and a new graduate class is being developed to specifically study in-situ combustion and work with this apparatus. Graduate students will be able to work with this apparatus, and a number of graduate and undergraduate students will be able to obtain funding to assist with the construction and testing of the apparatus. This new equipment will also be a centerpiece of various engineering outreach events, and could be used to help generate enthusiasm about petroleum engineering among K-12 students.

In addition to the various educational uses of this equipment, this equipment will allow the department to conduct research in enhanced in-situ combustion, such as experimenting with different well configurations, solvents, and catalysts. Another important research opportunity will be in studying the effluent gasses produced, mainly CO and CO_2, and modeling how they are sequestered or migrate. We will also make this apparatus available to industry partners to conduct the preparatory laboratory analyses required to implement a field scale in-situ combustion project.

1. Project Description

1.1 Objectives and Expected Significance

The main objective is to build a versatile combustion tube apparatus to simulate in-situ combustion of heavy crude oil. In order to predict recovery or other important parameters of a proposed in-situ combustion operation, specific lab tests need to be run using this type of apparatus. Establishing this lab will also allow for the conduction of research into improvements of the in-situ process and provide a controlled environment to study explosions in industrial settings. In addition, this lab will provide students with hands-on experience with this important recovery technique and establish Montana Tech as a resource for local industry as they design recovery operations for eastern Montana heavy crudes. The in-situ combustion process will also be modeled with a newly developed thermal reservoir simulator model. The laboratory results will be initially used to calibrate the simulator, and the simulator will then be able to help design and verify new combustion tube experiments.

1.2 Background and Technical Need

In Situ Combustion Background

It has been reported that up to 70% (1) of the world's remaining oil resources are heavy oils, including reserves in Canada and in eastern Montana. Recoverable reserves in the range of 1 billion barrels are believed to exist in the Jurassic Swift formation in Montana. (2) These heavy oils are produced using a variety of enhanced oil recovery techniques that lower the viscosity of the crude thus allowing it to flow to the producing wells. Common thermal recovery techniques include injecting steam to heat the oil and the reservoir, and creating a combustion process in the reservoir itself. This latter process, known as in-situ combustion, has a lot of advantages along with many challenges. The process of in-situ combustion involves injecting oxygen, air, or oxygen enhanced air into an oil reservoir. This injected air creates a burning front which moves away from the injector wells in the direction of the producers. Ahead of this burning front is a mobile bank of upgraded oil which can be produced. Multiple processes are taking place during in-situ combustion. When oxygen is initially injected, a low-temperature oxidation takes place causing a release of heat and an increase in temperature. This temperature increase can lead to a spontaneous ignition and create the burning front (3). The high temperatures ahead of the burning front cause cracking of the heavy oil, producing a coke-like substance that serves as the fuel for the combustion (4). The remaining oil is lighter and less viscous, and moves ahead of the burning front towards the producing wells. The in-situ combustion process not only makes the oil less viscous, thus allowing it to be produced, it also upgrades the heavy oil, thus reducing the amount of refining required.

A number of methods have been proposed in order to enhance this in-situ process, including following the injection of air/oxygen with water in a process known as wet combustion (5). The

heat in the recently burned zones will vaporize the water, thus creating the benefits of a steamflood along with the fireflood. Other enhancements include reversing the direction of the combustion to prevent a cold oil bank from forming around the producing well and restricting flow (6) and adding catalysts or solvents (7). The proposed laboratory equipment will be able to model these enhancements and investigate new ones as well.

In-situ combustion is a promising technique in many respects. It produces a high percentage of the original oil in place, the oil that is produced has been upgraded to lighter crude, and the injected air is abundant and cost effective. It has been noted, however, that in-situ combustion may not have reached its full potential (8) in field applications, and more research into both basic in-situ combustion and enhanced techniques is necessary.

Laboratory results from combustion tubes

In many forms of thermal recovery, such as steamfloods, basic calculations can be done quickly to estimate oil recovery and the size and growth rate of the heated area. These calculations are based on general reservoir information such as permeability and porosity, basic and easily measured oil and gas properties such as specific gravity and viscosity, and tabulated heat properties of water and reservoir rock (9,10). Such calculations can be a first step in deciding whether to proceed with a project. In the case of an in-situ combustion proposal, however, significant laboratory work is required in order to estimate oil recovery.

One of the first things that need to be determined to evaluate a potential fireflood is the amount of fuel that will be consumed per bulk reservoir volume. This is typically found in the lab by saturating a core or sandpack with a sample of the crude from the reservoir, placing it in a combustion tube, and measuring the amount of fuel used. This amount is then corrected due to the difference in porosity of the lab sand pack and the reservoir rock using equations such as Nelson and McNiel's (11).

$$m_R = \frac{1-\phi}{1-\phi_E} m_E \quad \text{.....(1)}$$

m_R: mass of fuel burned per bulk reservoir volume
m_E: mass of fuel burned per bulk volume of lab sample (core or sandpack)
φ: porosity of the reservoir
φ_E: porosity of the core or sandpack

The mass of fuel burned per unit volume in the lab will be able to be obtained by a mass balance based on careful measurements of the initial elements in the combustion tube, the remaining elements in the tube, and the liquids and gases collected at the end. With the knowledge of fuel consumed, it is possible to estimate the amount of air or oxygen required for a field scale project. Since in-situ combustion involves a chemical reaction of the oil with the oxygen, the parameters of that chemical reaction are also relevant to the process. While combustion of a single hydrocarbon in oxygen or air can be described as a fairly simple chemical equation, the

combustion of a complex mixture of hydrocarbons in oxygen results in an equation with two important unknowns.

$$CH_x = (1 - 0.5m' + 0.25x)O_2 \rightarrow (1 - m')CO_2 + m'CO + \frac{x}{2}H_2O \quad \text{.....(2)}$$

These unknowns are x, the atomic hydrogen/carbon ratio for the heavy oil and m', the ratio of CO to the total amount of CO_2 and CO produced by the reaction. Both of these can be measured using this lab apparatus using a relationship such as: (10)

$$x = 4(1 - m')\left(\frac{0.27c_{N_2} - c_{O_2}}{c_{CO_2}}\right) + 2m' - 4 \quad \text{.....(3)}$$

c_{N2}: concentration of N_2
c_{O2}: concentration of O_2
c_{CO2}: concentration of CO_2

In addition, other kinetic parameters can be determined experimentally that will allow for the prediction of time to ignition in a reservoir (12) and with all these factors determined, it is possible to predict the amount of oil produced from an in-situ project using a method such as the one described in Nelson and McNiels (11) paper, in which the oil produced is calculated as a function of the burned volume of the reservoir, which is in turn a function of the parameters described above, such as the mass of fuel burned and the air used.

Simulation Model

As a companion to the lab apparatus, a numerical model of the combustion tube was built to run in the Eclipse Thermal reservoir simulator. When the combustion tube apparatus is built and tested, this numerical model can be tuned to the actual experiments. Once that is done, it can be used to help understand issues relating to scale, such as the effects of the boundary of the combustion tube; as a first step to suggest new experiments; and to determine if the lab equipment is performing as expected with each new project.

The simulator was built to model a core of the same size as the actual core in the combustion tube apparatus. The porosity and permeability were set to reasonable values for an oil sand, with permeability in all directions of 2000 mD and a porosity of 30%. . The simulation experiment runs for approximately two months, with an initial air injection rate of 0.1 mcf/day which is raised to 0.4 mcf/day after the first month.

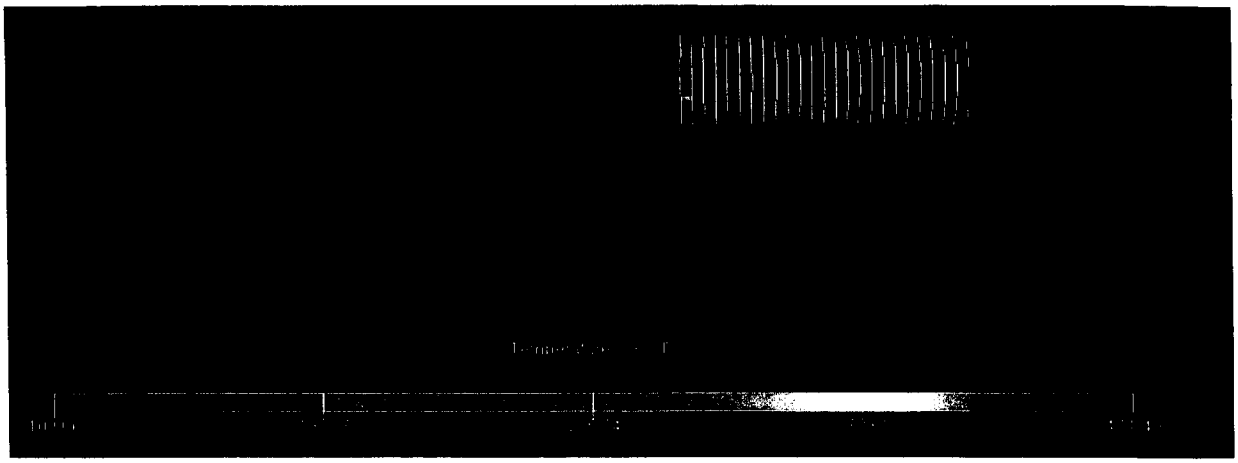


Figure 1: Temperature profile in the core at the beginning of the combustion.

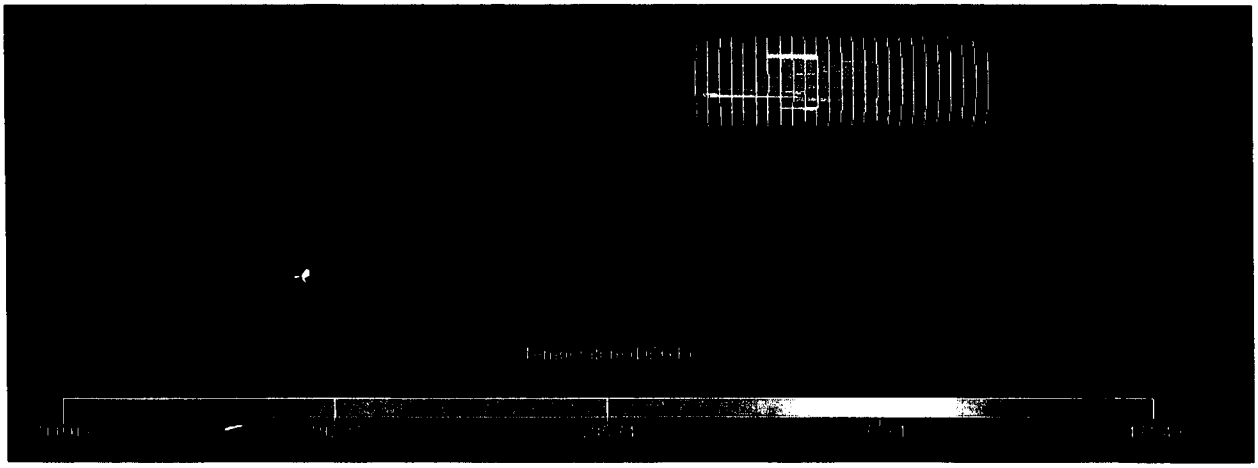


Figure 2: Temperature profile the end of the simulation run.

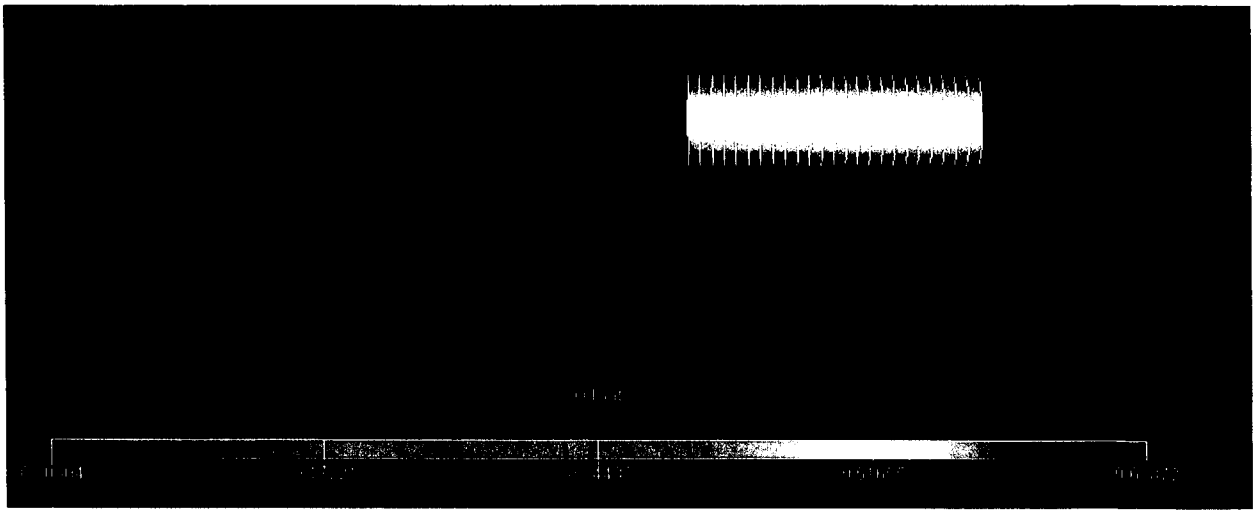


Figure 3: Oil Saturation at beginning of saturation run

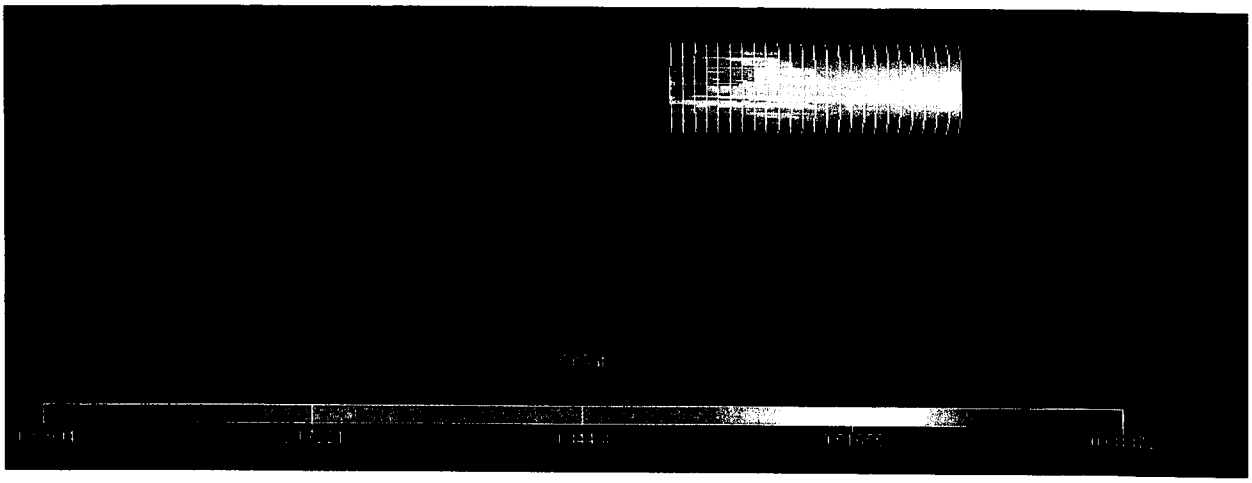


Figure 4: Oil Saturation at a later point in the saturation run, showing areas where the displaced oil has moved to increase the saturation at later places.

The simulation runs indicate that the combustion fronts are not stable. Unstable combustion fronts are considered one of the major drawbacks of in-situ combustion (13), therefore a major research goal of both the in-situ combustion tube and the simulated combustion tube is to determine if adding catalysts or solvents can lead to a more parabolic front.

In addition to the lab scale combustion tube simulation shown above, a second simulator model was created of a field scale in-situ combustion project. This model is currently being tuned by using the parameters described in a paper presented at the 1987 SPE Reservoir Simulation Symposium that provides valuable case study data of field and simulation tests (14).

1.3 Instrument Description

The work proposed here is to construct an in-situ experimental apparatus or combustion tube apparatus. Figure 5 illustrates the basic apparatus, and figure 6 is a more detailed description of a proposed combustion tube.

The combustion tube apparatus will consist of an insulated two-part combustion tube with an inner tube which will typically be filled with either a water, sand and heavy crude oil mixture or a core sample, modeling a typical heavy oil reservoir. A second tube will also be developed that will allow for a horizontal producing well to be modeled.

This inner combustion tube will be placed in the center of an outer tube filled with sand or another insulating material such as vermiculite. For in-situ experiments, the combustion tube will have heating bands on the outside that are controlled with thermocouples inside the tube to minimize heat loss to the tube, enabling us to model a large reservoir that has little to no heat loss to the surrounding formations. This design of the external heaters is motivated by the work of Vossoughi, et al (15).

The outer tube serves two purposes, it insulates the combustion tube and it provides a safety barrier in case of a rupture of the inner combustion tube. Temperature measuring sensors will be placed in both the inner and outer tubes in order to plot temperature profiles.

The tube is connected to an oxygen and/or air tank, and the flow of air from the tanks is controlled by a mass flow controller. A pressure transducer allows the pressure of the air going into the combustion tube to be monitored. A small separator will be located at the other end of the combustion tube to separate out the produced oil and effluent gases. A gas chromatograph will be used to determine the composition of these produced fluids, as well as the composition of the initial heavy oil, so that upgrading of the heavy crude can be observed and measured. Using the work of M. Greaves et al as a starting point (18) we will also construct a second tube better designed to model the horizontal producer of the THAI configuration.

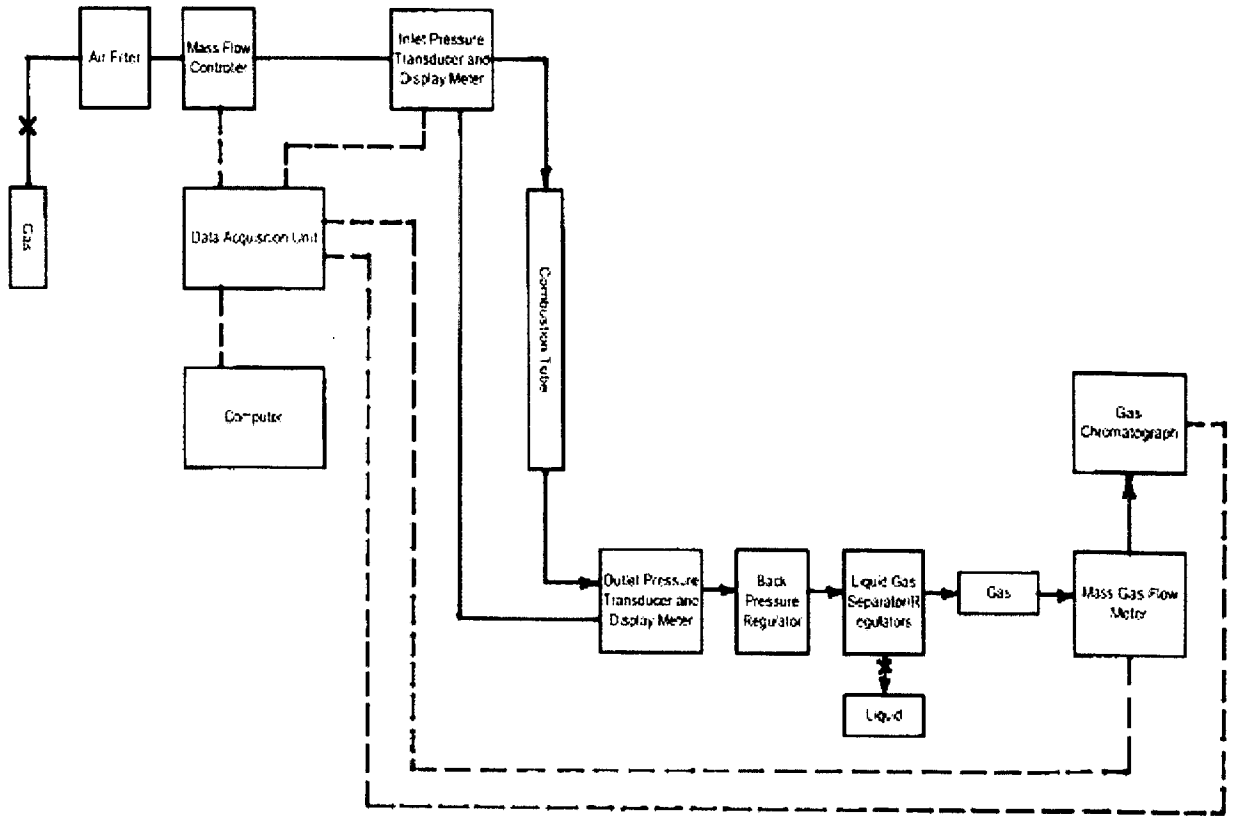


Figure 5: Diagram of Combustion Tube Apparatus

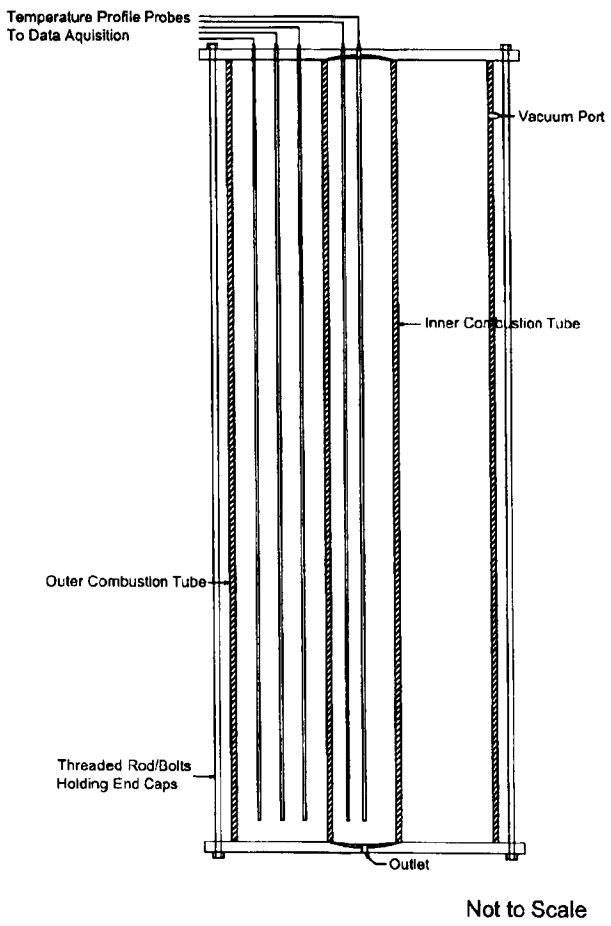


Figure 6: Detail of the combustion tube

1.4 Education and Research Applications

The purposes of constructing this equipment are to use it in conjunction with the undergraduate and graduate courses in thermal recovery and mine safety, provide research opportunities for graduate students, provide a tool for local producers to evaluate proposed in-situ projects prior to pilot tests, and developed research projects involving testing solvent and catalyst enhanced in-situ and mine safety.

Educational applications

PET 4420 Thermal Recovery Operations: In-situ combustion is challenging to visualize and model mathematically, so providing a means for students to actually observe the process would

greatly aid their understanding. In this course, which is currently taught every spring semester, students would participate in setting up, running and analyzing the results of a simple forward in-situ combustion experiment and would have the opportunity to observe whatever additional experiments are currently in process. By working on the equipment, students would learn how to prepare samples, measure the compositional changes of the oil, the rate of combustion and the properties of the effluent gases.

PET 5080 Thermal Recovery Methods: This class is listed in the Montana Tech catalog but has not been offered in recent history and has a very open ended course description. It is planned to make this course a regular offering for graduate students and interested undergraduates, with a focus on the in-situ combustion process and its enhancements. The combustion tube lab apparatus would play a significant role in the exercises and activities in this class. Students would gain hands on experience with the apparatus, and use it to run both simple forward combustion tests and more advanced processes. The data they collect would be used to design in-situ field tests. This will be valuable experience as the students will be entering an industry where heavy oil dominates the remaining reserves.

Graduate and Undergraduate Research: Work on this equipment, both in its development and later use can provide topics for undergraduate research projects, Master's thesis topics for students in our graduate petroleum engineering program and doctoral level work for students in our current joint Ph.D. programs with the University of Montana and Montana State and our proposed doctoral programs at Montana Tech. This proposal also includes funding for three students, two graduate and one undergraduate, who will participate in the construction, testing and maintenance of the apparatus.

K-12 Education: Although the main focus of this proposal is to construct an apparatus for undergraduate education, graduate education and research, there may be opportunities to demonstrate this instrument to area K-12 students to encourage interest in the field of petroleum engineering. The petroleum industry is facing a workforce crisis, and while enrollment is up in many petroleum engineering programs including Montana Tech's, there is concern that it will not be enough to meet the needs of the industry as it is facing what is commonly referred to as the 'Big Crew Change' (16). In 2006, a survey of high school students was developed to gauge the students' interest in pursuing a career in petroleum engineering. One perception that was common among these students was that the petroleum industry was low tech, and didn't capture their interest like perceived high tech fields did (17). One proposed solution was to expose students at an earlier age to some of the high tech research and modeling utilized by the industry. A demonstration of the in-situ combustion process in the combustion tube, paired with 3D graphic movies of the simulation model may be a good method of showing students this side of the industry and encourage them to consider careers in the oil and gas industry.

Montana Tech has a long history of inviting K-12 students to the campus to participate in various activities that showcase science, math and engineering, and a demonstration of this apparatus would be a good fit for many of these events.

Research Applications

In Situ Combustion: The research plans for this apparatus in the area of heavy oil recovery fall into two categories. The first is to perform the necessary laboratory work to determine the appropriate parameters for pilot projects utilizing basic forward in-situ combustion. The availability of the apparatus will be made know to area oil companies that are working in this area and they will be invited to work with our department to design the required tests. As many Montana Tech alumni are working in thermal recovery, the process of making the proper contacts will be simplified. The second research category involves looking at enhancements and modifications to the in-situ combustion process. These fall into four general groups: reverse combustion, where the combustion front moves in reverse from the producing well towards the injecting well; wet combustion, where the forward combustion process is followed by a water injection which is turned to steam by the remaining heat in the burned zone; the addition of solvents or catalysts to stabilize the combustion front, and toe heel air injection (THAI), where a vertical injection well is placed at the toe of a horizontal producer. Of these four groups, the first three can be modeled with this apparatus. Future plans will include developing a third combustion tube setup for THAI studies that can be used with this apparatus.

Funding sources for this research include the DOE and RPSEA (Research Partnership to Secure Energy for America) in addition to corporate support. Results of the research will be disseminated through articles and presentations in SPE conferences and journals, reports to project sponsors, and graduate thesis and dissertations.

1.5 Plan of Work

Stage 1: (approximately 6 months) At the start of this period graduate and undergraduate students will be hired, and the equipment required will be ordered and set up. Training will be scheduled on the set up and use of the gas chromatograph for heavy oil and of the use of the Eclipse combustion tube model.

Stage 2: (approximately 9 months) During this period, the combustion tube apparatus will be assembled and basic component testing will be performed. Any changes that need to be made to the simulation deck will be made at this time so that the dimensions and other relevant parameters of the model are the same as for the combustion tube.

Stage 3: (approximately 6 months) At this stage, three tests of the apparatus will be completed, a basic test involving the forward in-situ combustion of heavy oil as would be done for a classroom demonstration, a second enhanced combustion test, and an explosion test. For the first two tests, a corresponding simulation run will be conducted using Eclipse, and the combustion tube results will be compared with the simulation results.

Stage 4: (approximately 3 months) During this stage, improvements based on the test results will be made to the combustion tube apparatus and any problems discovered will be corrected. The simulation deck will also be tuned based on the combustion tube results. More in-situ runs may be performed at this time to further test the system. At this point a user's manual will be written as well.

1.6 Management Plan

Once the equipment is developed, there will need to be a management plan in place to ensure that it continues to be useable in the future. One major step in doing this will be to include the writing of a comprehensive user's guide in the project's plan of work. This user's guide will be useful in bringing new students, faculty and researchers up to speed on the operation and maintenance of the equipment. It will include sections on setup, packing combustion tubes, operation, data collection, safety, repair, parts replacement, and the simulation model, and will reference the user's guides that come with the auxiliary equipment, such as the gas chromatograph.

The lab apparatus will be stored and utilized in the research lab in the Petroleum Engineering department, except for when performing explosive experiments, at which point the necessary components will be moved to an outside pad. The in-situ combustion tube and the auxiliary equipment will become the property of the Petroleum Engineering department, and maintenance costs will be covered by program fees, new research funding generated by the apparatus and corporate support. The PI will coordinate the management of the apparatus.

2. References

1. "Worldwide Heavy Oil Reserves by Country." HeavyOilInfo.com. Schlumberger. March 10, 2009. http://www.heavyoilinfo.com/blog-posts/billion_bbls_6_usa.pdf
2. Sandomierski, A. E., Drenth, B. J., Trisch, S. P. "Heavy Oil Prospecting in Montana." presented at the 2002 Undergraduate Expo, Department of Geological Engineering and Sciences, Michigan Tech. http://www.geo.mtu.edu/FIELD_TRIPS/images2/index.html
3. Schoeppel, R. J., and Ersoy, D. "Prediction of Spontaneous Ignition in In-Situ Combustion." paper SPE 2383, presented at the Oklahoma Regional Meeting of the SPE, Stillwater, 1968.
4. White, Phillip, and Jon Moss, *Thermal Recovery Methods*. Tulsa: PennWell, 1983.
5. Alderman, John H. and Osoba, J.S. "A Study of Oil Recovery by In-Situ Combustion with the Addition of Water." paper SPE 3684, presented at the 42nd Annual California Regional Meeting of the SPE, Los Angeles, 1971.
6. Johnson Jr., L.A., et al. "An Echoing In-Situ Combustion Oil Recovery Project in a Utah Tar Sand." Journal of Petroleum Technology, **32.2** (1980) 295-305.

7. Ramirez-Garnica, M.A., et al. "Increase Oil Recovery of Heavy Oil in Combustion Tube Using a New Catalyst based Nickel Ionic Solution." paper SPE 117713, presented at the 2008 SPE/PS/CHOA International Thermal Operations and Heavy Oil Symposium, Alberta, 2008.
8. Belgrave, J.D.M. et al. "A Comprehensive Approach to In-Situ Combustion Modeling." SPE Advanced Technology Series, **1.1** (1993)98-107
9. Vogel, A., "Simplified Heat Calculations for Steamfloods", Journal of Petroleum Technology (July 1984) 1127-1136.
10. Prats, Michael, *Thermal Recovery.* , Richardson: SPE Monograph Series, Vol. 7.1985.
11. Nelson, T.W. and McNiel, J.S., "How to Engineer an In-Situ Combustion Project." Oil and Gas Journal (June 5, 1961) 58-65.
12. Burger, J.,"Spontaneous Ignition in an Oil Reservoir." Society of Petroleum Engineers Journal (April 1976) 73-81.
13. Akkutiu, I.Y, and Yortsos, Y.C., "Dual-role of Water-soluble Metallic Additives on Modifying In-situ Combustion Performance Using Large Activation Energy Asymptotics." paper SPE 115506, presented at the 2008 SPE Annual Technical Conference and Exhibition, Denver 2008.
14. Kumar, M., "Simulation of Laboratory In-Situ Combustion Data and Effect of Process Variations." paper SPE 16027, presented at the Ninth SPE Symposium on Reservoir Simulation, San Antonio, 1987.
15. Vossoughi, S. et al, "Automation of an In-Situ Combustion Tube and Study of the Effects of Clay on the In-Situ Combustion Process," Society of Petroleum Engineers Journal, (August 1982) 493-502.
16. Bos, C.F.M, Berkhout, A.J., Currie, P.K, Weijermars, R., "Accelerating the Build up of Experience with a View to the Imminent Big Crew Change.", paper SPE 113671, presented at the SPE Europec/EAGE Annual Conference and Exhibition, Rome, 2008.
17. Schrader, S.M., Balch, R.S., and Bunnell, D., "Where Will the Next Generation of Petroleum Engineers Come From? Disturbing Observations from a Texas Oil Town." paper SPE 110686, presented at the SPE Annual Technical Conference and Exhibition, Anaheim, 2007.
18. Greaves, M., et al, "THAI – New Air Injection Technology for Heavy Oil Recovery and In Situ Upgrading", Journal of Canadian Petroleum Technology (March 2001), 38-47.

3. Budget

Equipment		**$106,000**
Gas chromatograph	$75,000	
Profile temperature probes	$6,000	
Heating bands and controllers	$20,000	
Data acquisition unit	$5,000	
Computer		**$10,500**
Supplies		**$51,200**
Mass flow controller	$1,700	
Inlet pressure transducer and meter	$4,200	
Backpressure regulator	$1,000	
Liquid gas separator	$500	
Mass flow meter (gas)	$800	
Combustion tubes	$4,000	
Misc tubing, valves, fittings and supplies	$17,000	
Gas and regulators	$2,000	
Machine shop time/equipment	$15,000	
Furniture, benches, insulation	$5,000	
Salary		**$158,852**
4 Months Summer Salary S. Schrader	$33,432	
4 Months Summer Salary R. Schrader	$25,320	
2 graduate students	$78,000	
2 undergraduate students	$22,100	
Benefits		**$17,691**
Faculty Benefits 25%	$14,688	
Student Benefits 3%	$3,003	
Tuition		**$78,080**
Indirect costs (30.5% of salaries and benefits)		**$77,660**
Total		**$499,983**

Budget Justification

1. Equipment
    a. Gas chromatograph: The gas chromatograph is necessary to determine the chemical make-up of the heavy oil prior to combustion and of the lighter oil produced at the end of the combustion process. This allows the amount of upgrading caused by the in-situ combustion process to be measured. The likely choice will be an Agilent GC with a low thermal mass column suitable for heavy oil.
    b. Temperature probes: Custom temperature probes by Omega will be inserted in both the inner and outer combustion tubes will allow for accurate mapping of the temperature profile of both in-situ combustion and industrial explosion experiments.
    c. Data acquisition unit: Necessary to collect pressure and temperature data from inside the combustion tube and at the inlet and outlet.
    d. Heating bands and controllers: These will be used to raise the temperature of the metal combustion tube to match the internal temperature so that heat loss to the tube is minimized.

2. Computer hardware and software: A PC or laptop is necessary to work with the data acquisition unit ($500), and the remaining funds ($10,000) will be to pay for the non-donated portions of the Eclipse/Petrel software suite which will be used for modeling the in-situ combustion tube experiments and visualizing the results.

3. Supplies
    a. The mass flow controller, pressure transducers and meters, backpressure regulator, liquid-gas separator and mass flow meter are all components of the combustion tube apparatus as seen in Figure 5.
    b. Combustion tubes: This item is for the materials to build multiple inner and outer combustion tubes.
    c. Miscellaneous tubes, fittings and supplies: This item covers all the necessary connections, tubes and fittings as well as any unforeseen expenses or replacement of components damaged during shipment, construction or testing.
    d. Gas and regulators: This item will cover the necessary nitrogen, oxygen and other tanks and regulators.
    e. Machine shop equipment: This item will cover the purchase of small machining tools including a metal lathe for building the combustion tubes.

f. Furniture, benches and insulation: This item will cover the construction of the concrete table that the combustion tube will sit on, as well as a computer table and other chairs and tables as necessary.

4. Salaries and Benefits
   a. Summer salary for PI and Co-PI's: Susan Schrader and Richard Schrader will each draw two months summer salary per project year and be responsible for the supervising and participating in the construction of the apparatus, design experiments and tests and supervise students. In addition, Dr. Schrader will work with the simulation deck
   b. Graduate students: Two Masters-level graduate students will be funded with this project. The funding will cover a salary at the school's current rate plus 4 semesters of tuition at the out-of-state level per graduate student. The graduate students may also be given summer employment at a full time rate.
   c. Undergraduate students: Two undergraduate students will also work on this project during the academic year helping with the construction and use of the equipment. Undergraduate participation in this project is desirable as it will provide some continuity as a student who begins work on this project may be around for a second project after the combustion tube is completed.

4. Facilities and Special Considerations

The Petroleum Engineering department has just completed a move into a new building, with new state of the art research and teaching lab space. This equipment will be built and used in the reservoir engineering and research laboratory in this new building. A special concrete table will hold the combustion tube apparatus, which along with the nested tubes will provide a safety margin in case of a rupture of the inner tube. After construction, the equipment will be maintained along with the other equipment in the research lab, including a state of the art fracture conductivity system.

Biographical Sketch for Susan M. Schrader, PI

Department of Petroleum Engineering, Montana Tech of the University of Montana
Butte, MT. 59701, (406) 496-4796, sschrader@mtech.edu

Educational Experience

New Mexico Tech	BS Mathematics	1988
University of New Mexico	MA Applied Mathematics	1993
New Mexico Tech	PhD Petroleum Engineering	2004

Professional Experience

Montana Tech	Assistant Professor	2008-Present
UT of the Permian Basin	Assistant Professor	2006-2008
New Mexico Tech	Post-doctoral Researcher	2004-2006
New Mexico Tech	Research Assistant	2001-2004
ENMU-Roswell	Mathematics Faculty	1996-2003

Selected Publications

1. Steinberg, S., Das, B., Schaffer, S. and **Weber, S.M.**: "Finite Difference Methods for Modeling Porous Media Flows," in *Transport in Porous Media*, v 17 (1994) p. 171-200.
2. Balch, R.S., Ruan, T., and **Schrader, S. M.**: "Automating Basic Exploration Processes Using an Expert System: Applications to the Delaware Basin", in *The Permian Basin: Back to Basics*: West Texas Geological Society, Publication No. 03-112, p. 285-294.
3. **Schrader, S.M.**: "A New Method of Recoverable Reserves Estimation Using an Expert System," presented at the 2004 SPE Annual Technical Conference International Student Paper Contest, Houston, September 26.
4. **Schrader, S.M.** and Duettra, P., "Mathematics", in Lyons, B. and Pligsa, G.J.: *Standard Handbook of Petroleum and Natural Gas Engineering*, 2nd ed., Butterworth-Heinemann, 2004.
5. **Schrader, S.M.**, Balch, R.S., Ruan, T.: "Using Neural Networks to Estimate Monthly Production: A Case Study for the Devonian Carbonates, Southeast New Mexico," paper SPE 94089, presented at the 2005 SPE Production and Operations Symposium, Oklahoma City, April 17-19.
6. Li, G., **Schrader, S.M.**, Balch, R.S., and Ruan, T.: "Interpretations of Stratigraphic Inclines and Fractures of the Low Hill Carbonate Reservoirs, Liaohe Depression, Northeast China," presented at the 2006 AAPG Annual Convention, Houston, April 9 – 12.
7. **Schrader, S.M.**, Balch, R.S., and Bunnell, D.: "Where Will The Next Generation of Petroleum Engineers Come From? Disturbing Observations from a Texas Oil Town." presented at the 2007 SPE Annual Technical Conference and Exhibit, Anaheim, November 11-14.
8. Balch, R.S., **Schrader, S.M.**, and Ruan, T.: "Knowledge Engineering: Collection, Storage and Applications of Human Knowledge in Expert System Development," in *Expert Systems*, v 24(5), November 2007 p 346-355

9. **Schrader, S.M.**, Balch, R.S., and Ruan, T.: Understanding Neural Networks and their Applications in Petroleum Engineering." presented at the 2008 Southwestern Petroleum Short Course, Lubbock, April 23-24.
10. **Schrader, S.M.**, Balch, R.S., and Ruan, T.: The Fuzzy Expert Exploration Tool for the Delaware Basin, Development, Testing and Application, in *Expert Systems with Applications*, 2008, doi:10.1016/j.eswa.2008.08.004

Synergistic Activities

- Developed and taught courses in the thermal recovery of heavy oil and in reservoir simulation.
- Research assistant and post-doctoral researcher on DOE project involving the development of a successful expert system for oil exploration
- Has attended courses in Eclipse and Eclipse Thermal reservoir simulation
- Reviewer for ARPA-E and for the Society of Petroleum Engineers Journal of Reservoir Evaluation and Engineering
- Active member of the Society of Petroleum Engineers and a licensed professional engineer (Texas #100571, MT #19748)

Collaborators and Other Affiliations

Collaborators and Co-Editors

Dr. Paul Conrad	Montana Tech
Dr. David Bunnell	Montana Tech
Dr. Robert Balch	New Mexico Petroleum Recovery Research Center
Dr. Roger Ruan	New Mexico Petroleum Recovery Research Center
Dr. Stanly Steinberg	University of New Mexico
Mr. Guohui Li	PetroChina / China University of Petroleum

Graduate Advisors and Postdoctoral Sponsors

Dr. Robert Balch	New Mexico Petroleum Recovery Research Center
Dr. Lawrence Teufel	New Mexico Tech
Dr. Tom Engler	New Mexico Tech
Dr. Bob Bretz	New Mexico Tech
Dr. Jerry Parkinson	Los Alamos National Laboratory

Thesis Advisor for:

Joshua Isaiah	Montana Tech
Issac Attoborah	Montana Tech
Kesiena Doghor	Montana Tech
Brad Doyle	Montana Tech

Biographical Sketch for Richard J. Schrader, Co-PI

Department of Petroleum Engineering, Montana Tech of the University of Montana
Butte, MT. 59701, (406) 491-1489, ootigik@hotmail.com

Educational Experience

New Mexico Tech	BS Petroleum Engineering	1985

Professional Experience

Montana Tech	Research Staff/Lab Associate	2009-Present
New Mexico Tech	Senior Laboratory Associate	1985-2006

Selected Publications

1. Sydansk, R.D., Al-Dhafeeri, A., Xiong, Y., Schrader, R., and Seright, R.S.: "Characterization of Partially Formed Polymer Gels for Application to Fractured Production Wells for Water-Shutoff Purposes," SPE Journal of Production and Facilities, Vol. 20, No. 3 (August 2005) 240-249.

Synergistic Activities

- Principal laboratory staff for eight major funded projects on enhanced oil recovery
- Significant experience with the design and construction of core flooding equipment and core confinement systems
- Laboratory competencies include conducting high pressure, high temperature experiments and rheological and PVT studies using state of the art syringe pumps, rheometers, data acquisition units, total organic carbon analyzers, quartz precision differential pressure transducers and other lab equipment
- Proficient in machine shop practices
- Active member of the Society of Petroleum Engineers

Collaborators and Other Affiliations

Dr. Paul Conrad	Montana Tech
Dr. Susan Schrader	Montana Tech
Dr. Randy Seright	New Mexico Petroleum Recovery Research Center
Dr. Abdullah Al-Dhafeeri	Saudi Aramco
Dr. Robert Lane	Texas A&M
Dr. Jenn-Tai Liang	University of Kansas

CONSTRUCTING A COMBUSTION TUBE APPARATUS TO STUDY IN-SITU COMBUSTION OF HEAVY CRUDE OIL

MOTIVATION

It has been reported that up to [illegible] of the world's remaining [illegible] resources are heavy, [illegible] including reserves in Canada and in eastern Montana.

Recoverable reserves in the range of 1 billion barrels are believed to exist in the [illegible] Swift formation in Montana (2)

This puts Montana Tech in a good position to study heavy oil recovery. U.S. reserves of heavy crude are nearby, and with our transfer agreement with two Alberta schools, many students arrive at Tech with a strong interest in working with heavy oil.

The undergraduate class in Thermal Recovery is very popular, and a new graduate class is being developed to specifically study in situ combustion and work with this apparatus.

1. Worldwide Heavy Oil Reserves by Country. HeavyOilInfo.com. Schlumberger. March 10, 2009

2. [illegible], A. F., Drenth, B. J., Tusch, C. P. Heavy Oil Prospecting in Montana, presented at the 2002 Undergraduate Expo, Department of Geological Engineering and Sciences, Michigan Tech.

IN SITU COMBUSTION

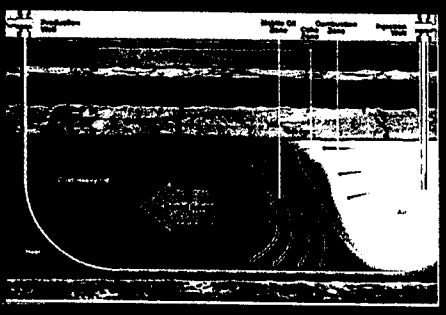
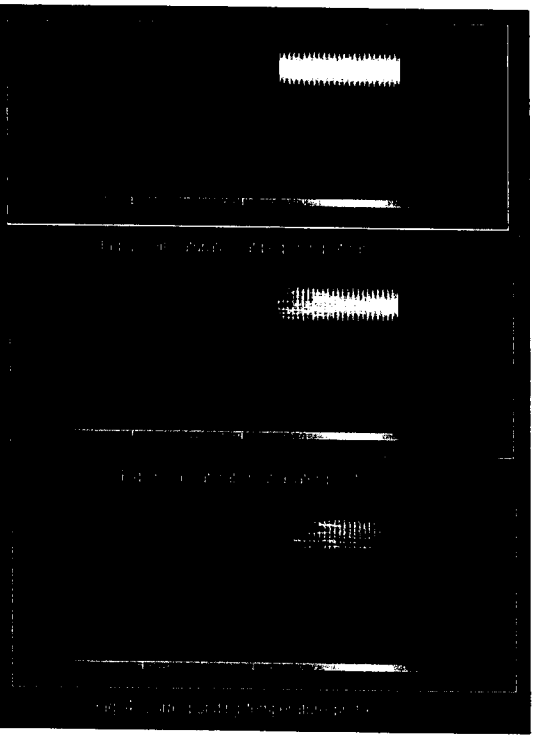


Fig. 1 THAI process

SIMULATION RESULTS



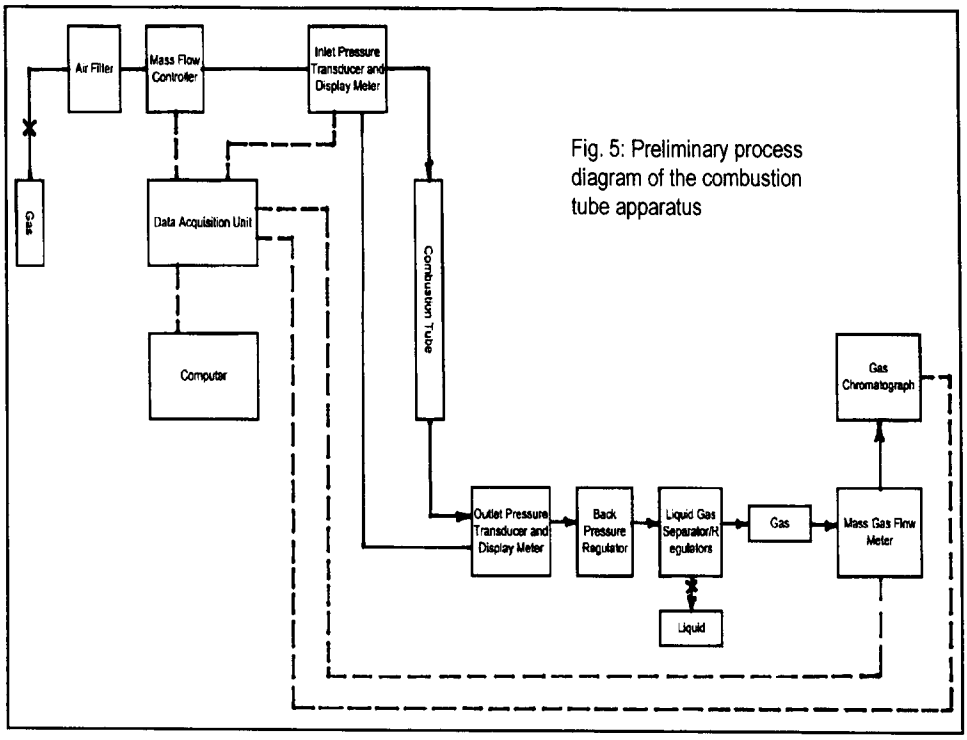
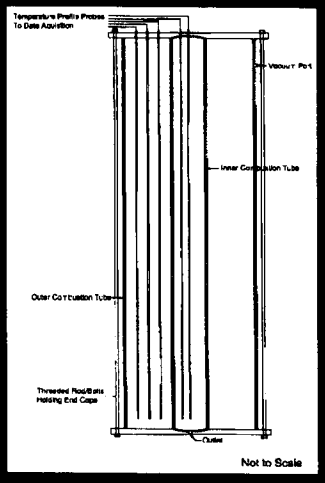


Fig. 5: Preliminary process diagram of the combustion tube apparatus

DIAGRAMS OF THE COMBUSTION TUBE APPARATUS



- The image to the left is the vertical combustion tube designed by the project team.
- It consists of two stainless steel tubes with heavy caps and ports and an outer tube with insulation.
- Temperature probes run through the length of both tubes to measure the temperature profile and upstream gases collected at the output.
- Heat tape can be used on the outside of the inner tube to prevent vapor effects.
- A vertical production line will replace the outlet to model THAI.

Fig. 6: Diagram of conventional combustion tube

Montana Board of Oil and Gas Conservation

Development of Procedures Manuals and a Field Inspection System

Concerns from the Audit

1. Inspection procedures, documentation and risk prioritization (Recommendations 1, 2, 3)
2. Timelines and guidelines for policy enforcement and corrective actions (Recommendation 4)
3. BOGC compliance with State of Montana IT policies (Recommendations 5, 6 and 7)

Procedures Manual

New document based on several sources

- Existing BOGC Inspection Procedures
  - Written documentation
  - Interviews/Ride-alongs with field inspectors
- Mapped one-to-one to appropriate BOGC regulations
- EPA manuals, as appropriate
- Electronic format with revision system

Addresses concerns 1 and 2

Field Inspection System

New tablet-based inspection system with coordinated server application

- Standardized reporting form(s) with data pre-filled from RBDMS.
- System synchronizes data with RBDMS via secure ethernet or wireless
- Automated re-inspection reminders

Addresses concerns 1, 2, 3 and 4

Proposed - Two-Phase Project

- Phase 1 – Develop scope-of-work
  - Review pertinent documents
    - Existing procedures documentation, forms
    - Report from the Legislative Audit Committee
    - EPA UIC manual
    - Applicable Montana Regulations
  - Write specifications
    - Recommended deliverables
    - Estimate of effort
    - Draft of RFQ

Contract for Services

- Generate RFP and award contract (BOGC)
  - Allocate tasks to internal and external resources
- Phase 2 - Develop deliverables (External)
  - Working document and software substantially complete by Nov 2012
  - Testing and revision through Feb 2013
  - First article, April 2013

Tech's Proposal for Phase 1 – Develop Scope-of-Work

- Jan 2012 – Montana Tech team formed
- Feb – Review of source materials complete
- Mar – Review with BOGC staff
- Apr – Deliver scope-of-work to board

- Faculty team support – $5,000
- Indirect costs, 25% (State of Montana rate)
- Total proposed phase 1 = $6,250

7

Montana Tech Interdisciplinary Team

- Petroleum Engineering
  - John Getty, Mary North-Abbott, Leo Heath, Sue Schrader
- Technical Communication
  - Chad Okrusch, Heather Shearer, Kay Eccleston
- Computer Science and Software Engineering
  - Jeff Braun, Frank Ackerman, Michele Van Dyne, Keith Vertanen, Celia Schahczenski
- Environmental Engineering
  - Kumar Ganesan

8

Department of
Technical Communication*

Expertise in:
- Structure and design of work procedures
- Usability testing
- User-centered design

* Formerly Professional and Technical Communications (PTC)

10

Department of
Computer Science and Software Engineering

Expertise in:
- Database development
- Human-Machine interfaces
- Touch pad applications
- Networked systems design

11

Department of
Environmental Engineering

Expertise in:
- Regulatory requirements
- Best practices for emergency response
- Prevention and remediation of environmental risks
- Risk assessment

12

Contact

John Getty, Instructor
Petroleum Engineering
Montana Tech
1300 W. Park St
Butte, MT 59701
(406)496-4847
jgetty@mtech.edu

MontanaTech
THE UNIVERSITY OF MONTANA

13

EXHIBIT 8

Mountain Pacific General

302 Eighth Avenue SE; Cut Bank, MT 59427; Phone: (406) 257-7440; Fax: (406-257-7441)
stewart55@bresnan.net

December 14, 2011

Montana Board of Oil and Gas
2535 St. Johns Avenue
Billings, MT 59102

Dear Madame Chair and Board Members:

First, I would like to apologize for not making it to this month's business meeting. In lieu of appearing in person, I would like to update you on MPG's progress in this letter.

MPG has contracted with Liquid Gold of Cut Bank to plug two more wells. They have not been done yet due to Liquid Gold busy schedule, but Shane Schwindt and Gary Klassen can verify they are in the works.

Secondly, and perhaps most importantly, MPG is finally in the position where our assets exceed our liabilities. This has allowed us to develop an exit strategy that includes selling some or all of the producing properties.

Due to the nature of Montana's law of transparency in open meetings, I will not include any details on our financial condition other than to say it is improving and we plan to diligently continue to nip away at all issues concerning the Board of Oil and Gas.

Thank you for your support and patience in this matter. I plan on appearing at the next business meeting. Should you have any questions, please don't hesitate to contact myself or Danny Murphy at 406-873-0040.

Sincerely,

Joni Stewart

Joni Stewart, General Manager

EXHIBIT 9

3/31/2011

Montana Oil And Gas
attn: Tom Richmond
2535 St. Johns
Billings, Mt 59101

re; Walker Well 44-2 Dawson County
Section 2, twn 19n, rg 53E

Dear Mr. Richmond

There has been a lease between E & E Walker, Inc and Energy Equity Co (Jerry Nelson, president), for the attached lease. E & E Walker, Inc has not received payment on this lease since Feb. 2007 for production in 2006. There was no production in 2007. Therefore under terms of the lease, the lease has expired.

Consider this an abandoned well. We are requesting that Montana Oil and Gas declare this an abandoned well and request that you require operator to plug the well and restore the property.

Please call if there is any other information needed. Thank you.

Sincerely,
Eva Preston, President

Eva Preston

E & E Walker, Inc
202 Clay St.
Glendive, Montana 59330
Phone 406-377-8902

BOOK : 77 184

Billings Blue Print
Billings, Montana

OIL AND GAS LEASE

AGREEMENT, Made and entered into this 20 day of June 1985

by and between E & E Walker, Inc., a Montana Corporation

Bloomfield, Montana 59315

Party of the first part, hereinafter called lessor (whether one or more) and

Ronald Ries of Billings, Montana

Party of the second part, hereinafter called lessee

WITNESSETH, That the said lessor, for and in consideration of - Ten and more - DOLLARS cash in hand paid, receipt of which is hereby acknowledged and of the covenants and agreements hereinafter contained on the part of lessee to be paid, kept and performed, has granted, demised, leased, and let and by these presents does grant, demise, lease and let unto the said lessee, its successors and assigns for the sole and only purpose of surveying by geological, geophysical and all other methods, mining and operating for oil and gas, and laying pipe lines, and building tanks, power stations and structures thereon to produce, save and take care of said products, all that certain tract of land, together with any reversionary rights therein, situate in the County of Dawson State of Montana described as follows, to-wit:

Township 19 North, Range 53 East

Section 2: The SE¼

This lease form is altered and amended to the extent that in each and every place where the fraction "1/8" appears it is changed to "1/6".

Filed containing 160 acres, more or less.

It is agreed that this lease shall remain in force for a term of ~~ten~~ years from date, and as long thereafter as oil or gas, or either of them, is produced from said land by the lessee, its successors and assigns;

In consideration of the premises the said lessee covenants and agrees:

First. The lessee shall deliver to the credit of lessor as royalty, free of cost in the pipe line to which lessee may connect its wells, the equal one-eighth part of all oil produced and saved from the leased premises, or, at lessee's option, may buy or sell such one-eighth royalty and pay lessor the market price for oil of like grade and gravity prevailing in the field on the day such oil is run into pipe lines or into storage tanks.

Second. The lessee shall pay lessor, as royalty, one-eighth of the proceeds from the sale of the gas, as such, for gas from wells where gas only is found and where not sold shall pay a sum equal to the annual delay rental herein as royalty, and while such royalty is so paid such well shall be held to be a producing well. The lessor to have gas free of charge from any gas well on the leased premises for stoves and inside lights in the principal dwelling house on said land by making his own connections with the well, the use of said gas to be at the lessor's sole risk and expense.

Third. To pay lessor one-eighth (⅛) of the market value at the well for gas produced from any oil well and used off the premises, or for the manufacture of casing-head gasoline or dry commercial gas.

If no well be commenced on said land on or before the 20 day of June 1986, this lease shall terminate as to both parties, unless the lessee on or before that date shall pay or tender to the lessor or to the lessor's credit in the First Security Bank at Glendive, Montana 59330 or its successor or successors, or any bank with which it may be merged, or consolidated, or which succeeds to its business or assets or any part thereof, by purchase or otherwise, which shall continue as the depository regardless of changes in the ownership of the said land, the sum of - Eighty and No/100 - DOLLARS, which shall operate as a rental and cover the privilege of deferring the commencement of a well for twelve months from said date. In like manner and upon like payments or tenders the commencement of a well may be further deferred for like periods of the same number of months successively. And it is understood and agreed that the consideration first recited herein, the down payment, covers not only the privileges granted to the date when said first rental is payable as aforesaid, but also the lessee's option of extending that period as aforesaid, and pay any and all other rights conferred. Rentals may be paid by check or draft and may be remitted by mail. Mailing of rental on or before the rental-paying date shall be deemed a timely tender thereof and shall preclude termination of this lease. Notwithstanding the death of the lessor, or his successor in interest, the payment or tender of rentals in the manner provided above shall be binding on the heirs, devisees, executors and administrators of such person.

Should any well drilled on the land above described be a dry hole or cease to produce and there are no other producing well or wells on the land or drilling operations are not being conducted thereon, then and in that event if a well is not commenced before the next rental paying date this lease shall terminate as to both parties, unless the lessee on or before the next rental paying date shall resume the payment of rentals in the same amount and in the same manner as hereinbefore provided, and it is agreed upon the resumption of the payment of rentals, as above provided, the last preceding paragraph hereof, governing the payment of rentals and the effect thereof, shall continue in force as though there had been no interruption in the rental payment.

If said lessor owns a less interest in the above described land than the entire and undivided fee simple estate therein, then the royalties and rentals herein provided shall be paid the lessor only in the proportion which his interest bears to the whole and undivided fee. However, such rentals shall be increased at the next succeeding rental anniversary after any reversion having occurred to cover the interest so acquired with or without notice of said reversion to lessee.

Lessee shall have the right to use, free of cost, gas, oil and water produced on said land for its operations thereon, except water from wells and reservoirs of lessor. Lessee shall have the right at any time to remove all machinery and fixtures placed on said premises, including the right to draw and remove casing.

Lessee shall pay for all damages caused by its operations on said lands. When requested by the lessor, lessee shall bury his pipe lines below plow depth. No well shall be drilled nearer than 200 feet to the house or barn now on said premises, without the written consent of the lessor.

Lessee shall have the right to drill to completion with reasonable diligence and dispatch (1) any well commenced within the term of this lease, and (2) any well commenced before the completion of a well which has been commenced within such term. If oil and gas or either of them be found in paying quantities in any such well this lease shall continue and be in force with like effect as if such well had been completed within the term of years herein first mentioned.

Lessee is hereby granted the right and power to pool or combine the acreage covered by this lease, or any portion thereof, with other land, lease or leases in the vicinity thereof at any time and from time to time, whether before or after production, when in lessee's judgment it is necessary or

NMLMOA-2
MLMOA-2
MidPlains LMOA-2
SEE EXHIBIT

Oil and Gas Lease

This agreement IS MADE AND ENTERED INTO THIS 3rd DAY OF October, 19 95, BY AND BETWEEN

E & E Walker, Inc., A Montana Corporation

OF 202 Clay, Glendive, Montana 59330

HEREIN REFERRED TO AS THE "LESSOR" (WHETHER ONE OR MORE) AND Guy L. Wiggs

OF P. O. Box 1069, Columbus, Montana 59019

HEREIN REFERRED TO AS THE "LESSEE" (WHETHER ONE OR MORE).

The Lessor, for and in consideration of Ten & More Dollars, ($ 10.00 +), the receipt of which is hereby acknowledged, and of the covenants and agreements herein set forth on the part of the Lessee to be paid, kept and performed, does grant, demise, lease and let exclusively unto the lessee, for the purpose and with the exclusive right of exploring by geophysical and other methods, drilling and operating for and producing therefrom oil and gas of whatever nature or kind, and with rights of way and easements for laying pipelines, power lines, building tanks, power stations, ponds, roadways, and structures thereon for producing, saving, treating and caring for such products produced on the leased premises and any and all other rights and privileges necessary or incident thereto,

all that certain tract or tracts of land, together with any reversionary rights therein, situated in the County of Dawson

State of Montana, described as follows:

See Exhibit "A" attached hereto and make a part hereof.

For the purpose of determining the amount of any money payment under this lease this land shall be considered to contain 1119.12 acres.

1. TERM. Subject to the other provisions of this lease, this lease shall remain in force for a term of 3 years from this date (herein called "primary term") and as long thereafter as oil or gas is produced from said land or as long thereafter as lessee is engaged in actual drilling or reworking operations on said land as hereinafter provided.

2. ROYALTY. The lessee shall pay to the lessor, as royalty, free of cost, the following: (a) On Oil, 16 2/3% of that produced and saved from said lands, the same to be delivered at the wells or to the credit of the lessor into the pipelines to which the wells may be connected. Lessee may from time to time purchase any royalty oil in its possession, paying the market price for oil of like grade and gravity prevailing in the same field or area on the day such oil is run into the pipelines or into storage tanks. (b) On gas of whatsoever nature or kind produced and sold from said land or used for the manufacture of gasoline or any other products 16 2/3% of the proceeds from the sale of such gas at the mouth of the well. Lessee agrees that all royalties accruing to lessor under this lease shall be without deduction for cost of producing, gathering, storing, separating, treating, dehydrating, compressing, processing, transporting and otherwise making the oil, gas and other products hereunder ready for sale or use.

3. SHUT IN GAS WELL. If a well capable of producing gas is shut in such well shall not be considered to be producing gas in paying quantities. Nonetheless lessee shall be entitled to extend this lease beyond the primary term by paying or tendering to lessor on or before the anniversary date of this lease following the expiration of the primary term, and annually thereafter while such well is shut-in, for a period of 2 years after the expiration of the primary term, an amount equal to One dollars per acre held under this lease by such shut-in well. Such payments shall under no circumstances be construed as continuing the lease beyond the above stated time period. Payments may be tendered to lessor or to lessor's credit by check or draft mailed or delivered to the depository bank designated herein. "Shutting-in" of a well shall occur on the date on which production casing in such well is perforated and a gas flow test discloses that the well is capable of production in paying quantities. Until such casing shall have been run and the gas flow tested, no well shall be considered "shut-in."

4. LESSOR'S GAS USE. Lessor shall have gas free of charge from any gas well on the leased premises for use in lessor's buildings, structures, and improvements now existing or hereafter constructed for domestic and farming and ranching purposes provided that for each gas well lessor shall be limited to -0- mcf of gas per -0- (time period). Lessor shall make his own connections to the well and the use of the gas shall be at lessor's sole risk and expense. Lessor shall have the same rights as above provided to free gas from wells located on lands with which the leased lands are pooled or unitized.

5. RENTAL. If no well be commenced on said land on or before one year from the date hereof, this lease shall terminate as to both parties, unless the lessee, on or before that date, shall pay or tender to the lessor or to the lessor's credit in the Pay Direct to Lessor Bank at Glendive, Montana, or its successors, which shall continue as the depository of any and all sums payable under this lease regardless of changes in the ownership of said land or of the oil and gas or the rentals to accrue hereunder, the sum of One Thousand One Hundred Nineteen and 12/100 Dollars, 1,119.12, which will operate as rental and cover the privilege of deferring the commencement of a well for one year from said date. In like manner and upon like payments or tenders, the commencement of a well may further be deferred for like periods successively. All payments or tenders may be made by check or draft of lessee or any assignee thereof, mailed or delivered on or before the rental date, either directly to lessor or assigns or to said depository bank.

6. SEGREGATION CLAUSE. Production from any well drilled hereunder, payments for any shut in gas well, or lessee's drilling or reworking operations shall not serve to extend the primary term of this lease nor to relieve the lessee from rental payments except as to such lands as are contained within the spacing unit within which the well is located. This clause shall also apply to pooled and unitized lands with production thereon extending the primary term of this lease only for such pooled or unitized lands.

7. DRY HOLE. If, prior to discovery of oil or gas on said lands, and during the primary term hereof, lessee drills a dry hole or holes thereon and the drilling of another well is not commenced before the next anniversary of this agreement, this lease shall terminate as to both parties, unless the lessee, on or before said date shall resume payment or tender of rentals in the same amount and same manner as hereinabove provided. Upon such resumption of the payment or tender of rentals, paragraph five (5) governing the payment of rentals and the effect thereof shall continue in force as though there had been no interuption in the rental payment.

8. CESSATION OF PRODUCTION. If after the discovery of oil or gas the production thereof should cease from any cause this lease shall terminate unless the lessee commences additional drilling or reworking operations within 60 days thereafter, or, if it be within the primary term, unless the lessee resumes the payment or tender of rental on or before the next rental paying date after the cessation of production. In the event of such drilling or reworking operations, or if the lessee is drilling or reworking any well or wells at the end of the primary term of this lease, this lease shall remain in force during the diligent prosecution of such operations and, if production results therefrom, then as long thereafter as production continues.

9. LESSER INTEREST. If the lessor owns less interest in the above described lands than the entire and undivided fee simple estate therein, then the royalties and rental herein provided shall be paid to the lessor only in the proportion which his interest bears to the whole and undivided fee. However, such rentals and royalties shall be increased at the next rental paying date after lessee has been notified of lessor's acquisition of additional interest by reversion or otherwise.

10. NOTICE TO LESSOR AND OCCUPANT. Lessee agrees to notify lessor, and the person in possession of the surface of said land if other than the lessor, in writing at least twenty days but not more than ninety days before a well is commenced of lessee's intent to commence a well, the date operations are proposed to begin and the location of the well. After completion of the well, if requested by lessor, lessee shall provide lessor with copies of all logs, reports and other geological information filed with the Montana Board of Oil and Gas Conservation at the time such information is so filed. Lessee further agrees to notify lessor in writing within 30 days after plugging and abandoning any well, giving the well name, location and date of plugging.

11. LESSEE'S GAS USE. Lessee shall have the right to use, free of cost, gas, oil and salt water produced on the lands for his operations thereon in connection with the production of oil, gas, or either of them, from said lands.

12. PIPELINES. Lessee shall bury all pipelines at least six feet below the surface.

13. WELL LOCATION. No well shall be drilled nearer than 600 feet to any house, barn or other building or structure now on or hereafter constructed on said premises, without lessor's prior written consent.

14. DAMAGES. The lessee shall pay for all damages caused by his exploration or production operations on said lands including trail damages. Within six months after completion of a well or plugging and abandoning a well, lessee shall remove all material from any pits which are not necessary for operation of the well and shall fill any such pits. Within said six month period lessee shall also reclaim the drilling site as completely as reasonably practical commensurate with producing the well if the well is a producing well. Within one year after termination of this agreement lessee shall restore any previously unrestored lands to their original condition, as near as reasonably practical.

15. REMOVAL OF PROPERTY. The lessee shall have the right to remove all machinery, fixtures, buildings and other structures placed on the lands, including the right to draw and remove casing, within six months of the expiration of this lease or the early termination thereof, and all of the same not so removed shall become the property of the lessor at the expiration of such six months period.

16. SATLWATER DISPOSAL WELLS. This lease shall not include the right to drill wells for or use existing wells for salt water disposal.

17. ASSIGNMENT AND CHANGE OF OWNERSHIP. If the estate of either party hereto is assigned, and the privilege of assigning in whole or in part is hereby expressly allowed, the covenants hereof shall extend to and be binding upon the heirs, devisees, estate representatives, successors and assigns of the parties. No change in ownership of the land or assignment of rentals or royalties by lessor shall be binding on the lessee until the lessee has been furnished with an executed or certified copy of the transfer or assignment. In the event of the assignment of this lease in whole or in part by lessee or lessee's successors or assigns, such assignment shall not be binding on lessor until lessor is notified in writing of such assignments and of the name and address of the assignee.

18. RELEASE. Lessee may at any time release this lease as to part or all of the lands described herein by delivering or by placing a release of record in the proper county. In the event of a partial release, the annual delay rental above mentioned shall be reduced proportionately. Within 60 days after the expiration of this lease or any portion thereof for any reason, lessee shall place a release of record in the proper county or counties and shall mail or tender a copy of such release to lessor.

19. EXCUSE OF PERFORMANCE. All express or implied covenants of this lease shall be subject to all Federal and State Laws, Executive Orders, Rules or Regulations, and this lease shall not be terminated, in whole or part, nor Lessee held liable in damages, for failure to comply therewith, if compliance is prevented by or if such failure is the result of any such Law, Order, Rules or Regulation.

20. WARRANTY. Lessor makes no warranty, express or implied, as to lessor's title to the above described land except that lessor agrees to defend whatever title lessor has and agrees that the lessee, at its option, may pay and discharge in whole or in part any taxes, mortgage, or other liens, existing, levied, or assessed on or against said land, and in the event it exercises such option it shall be subrogated to the rights of any holder or holders thereof and may reimburse itself by applying to the discharge of any such mortgage, tax or other lien, any royalty or rentals accruing hereunder. Lessor further agrees that any interest or title to said land acquired by lessor after the date hereof shall be subject to this lease to the same extent as if said interest or title had been held by Lessor at the date hereof. In such event the amount of rental payable hereunder shall be approximately adjusted at the next ensuing rental date after lessee has been furnished evidence of such after acquired title.

21. PARTIES BOUND. This lease shall be binding upon all who execute it, whether they are named in the granting clause and whether all parties named in the granting clause execute this lease. All provisions of this lease shall inure to the benefit of and be binding upon the heirs, executors, administrators, successors and assigns of lessor and lessee. Lessor hereby waives and releases all rights of dower and homestead in said lands insofar as the rights granted under this lease might be affected thereby.

22. CAPTIONS AND TITLES. The captions, titles and paragraph headings throughout this lease are for convenience and reference and shall not be held to explain, modify, amplify, or aid in the interpretation, construction or meaning of the provisions of this lease, nor to define, limit or describe the scope or intent of a particular paragraph.

IN WITNESS WHEREOF the undersigned have executed this instrument on the date first above written..

By: Eva L. Walker, President Eva Walker

Attest: Colleen Berry, Sec.-Treas. Colleen Berry

E & E Walker, Inc., a Montana corporation
TIN: 81-0411807

STATE OF MONTANA
County of DAWSON } ss.

On this 3rd day of October, 19 95, before me, the undersigned, a Notary Public for the State of Montana personally appeared Eva Walker and Colleen Walker, Trustees of the Walker Family Trust dated August 5, 1991 known to me to be the person(s) whose names are subscribed to the foregoing instrument and acknowledged to me that he (she) (they) executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my Notarial Seal the day and year first above written.

Shirley A. Kreiman
Notary Public for the State of Montana

(NOTARIAL SEAL)

My commission expires 1-25-98

Residing at Glendive, Montana

Oil and Gas Lease

TO

STATE OF } ss.
County of

Filed for record this day of A.D., 19 at o'clock M., and recorded in Book of the records of page County, State of

County Recorder.

By Deputy.

Fees, $

EXHIBIT "A"

Attached to and made a part of that Oil and Gas Lease dated October 3, 1995 by and between E & E Walker, Inc., a Montana corporation, as Lessor, and Guy Wiggs, as Leasee

Township 19 North, Range 53 East, M.P.M.

Section 2: Lots 1(39.91),2(39.89),3(39.87),4(39.85),S2N2,SW4 less a .92 acre tract in Lot 1 more particularly described in Book A104 of Deeds on Page 362

Section 11: NW4

Section 12: A .52 acre tract in SW4SW4 more particularly described as follows: Beginning at the Southwest corner of said Section 12, thence North 33 feet, thence East 80 feet to the point of beginning, thence East 150 feet, thence North 150 feet, thence West 150 feet, thence South 150 feet to the point of beginning

Section 24: SW4

Section 25: W2

Upon the completion of any exploration activity or the termination of any production activity lessee agrees to reclaim any disturbed surface areas to as near original countour and condition as possible, including the re-seeding of such areas to grass.

Signed for Identification:

Colleen Berry

Colleen Berry, Sec.-Treas.

Eva L. Walker

Eva L. Walker, President

Plugging and Reclamation Bonds With Well List

ENERGY EQUITY COMPANY 59 **Bond:** G1 $10,000.00 Single Well Bond Active **Wells:** 1 **Allowed:** 1

Letter of Credit Active Wells Fargo Bank, NA $10,000.00 Approved 2/1/2002
Approved 4/7/2011

API #	Operator	Well	Location						Field	TD	PBTD	Status	
021-21108	Energy Equity Company	Walker 44-2	19 N	53 E	2	SE SE	660S	660E	Bloomfield	11270		SI	OIL

Comment: * $30,000 letter of credit. $10,000 producing well bond, $20,000 UIC bond. Letter of credit reduced to $10,000 to cover Walker 44-2 well only. $20,000 released on UIC bond as wells have been sold.

ENERGY EQUITY COMPANY 59 **Bond:** G2 $10,000.00 Single Well Bond Active **Wells:** 1 **Allowed:** 1

Surety Bond Active Lexon Insurance Company $10,000.00 Approved 5/27/2011

API #	Operator	Well	Location						Field	TD	PBTD	Status	
085-21228	Energy Equity Company	Elvin Horob 1-20	29 N	59 E	20	C SW SE	660S	1980E	Red Bank	13182	9500	PI	OIL

Comment: To cover the Elvin Horob 1-20 well

ENERGY EQUITY COMPANY 59 **Bond:** M1 $25,000.00 Multiple Well Bond Canceled **Wells:** 0 **Allowed:**

Surety Bond Canceled FAR WEST INS CO & UNDERWRIT $25,000.00 Approved 10/27/1994
Canceled 2/7/2002

Comment: 2/5/2001 - Bond amount reduced to $25,000 and Underwriters Indemnity Bond #B8066 cancelled.

ENERGY EQUITY COMPANY 59 **Bond:** U1 $20,000.00 UIC Limited Bond Released **Wells:** 0 **Allowed:**

Letter of Credit Released Wells Fargo Bank, NA $20,000.00 Approved 4/21/2006
Released 4/6/2011

Comment: * $30,000 letter of credit, $10K producing well, $20K UIC bond. Letter of credit reduced to $10,000 to cover Walker 44-2 well only. $20,000 released on UIC bond as wells have been sold.

ENERGY EQUITY COMPANY 59 **Bond:** U2 $10,000.00 UIC Single Well Bond Active **Wells:** 1 **Allowed:** 1

Surety Bond Active Lexon Insurance Company $10,000.00 Approved 6/10/2010

API #	Operator	Well	Location						Field	TD	PBTD	Status	
085-21290	Energy Equity Company	Panasuk 9 SWD	29 N	59 E	29	NE NW	660N	1980W	Red Bank	9650		IA	SWD

Comment: To cover the Pansasuk #9 SWD well.

DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION
BOARD OF OIL AND GAS CONSERVATION

BRIAN SCHWEITZER, GOVERNOR — OIL AND GAS CONSERVATION DIVISION

STATE OF MONTANA

July 26, 2010

Energy Equity Company
P.O. Box 785
Columbus, MT 59019
Attention: Mr. Jerry Nelson

RE: Energy Equity Company, Walker 44-2, SE SE Section 2 T19N R53E
API 25-021-21108

Dear Mr. Nelson,

This well was last produced in January 2007. Per Rule 36.22.1303 requires the well to be plugged and abandoned or a use for the well. My understanding is the well has mechanical issues and at this time cannot be produced. I need a sundry stating what the future plans are for this well or a plug and abandonment plan if the well has no future use.

36.22.1303 WELL PLUGGING REQUIREMENT

(1) The owner shall not permit any well drilled for oil, gas, saltwater disposal, or any other purpose to remain unplugged after such well is no longer useful for the purpose for which it was drilled or converted. When a well is no longer capable of production because the underlying reservoir or reservoirs are depleted and there is no possible future use for the well in supplemental recovery operations or for disposal facilities, the operator shall within one year plug and abandon the well as set forth in this subchapter, unless otherwise authorized by the petroleum engineer or his authorized agent.

History: 82-11-111, MCA; IMP , 82-11-123, 82-11-124, MCA; Eff. 12/31/72; AMD , 1998 MAR p. 482, Eff. 2/13/98.

Please contact me concerning your plans for this well. I can be reached at the Billings office at the number listed below.

Sincerely,

Steven Sasaki
Chief Field Inspector

DIVISION OFFICE
1625 ELEVENTH AVENUE
PO BOX 201601
HELENA, MONTANA 59620-1601
(406) 444-6675

TECHNICAL AND
SOUTHERN FIELD OFFICE
2535 ST. JOHNS AVENUE
BILLINGS, MONTANA 59102-4693
(406) 656-0040

NORTHERN FIELD OFFICE
201 MAIN STREET
PO BOX 690
SHELBY, MONTANA 59474-0690
(406) 434-2422

DEPARTMENT OF NATURAL RESOURCES
AND CONSERVATION
BOARD OF OIL AND GAS CONSERVATION

BRIAN SCHWEITZER, GOVERNOR

OIL AND GAS CONSERVATION DIVISION

STATE OF MONTANA

April 12, 2011

Energy Equity Company
P.O. Box 785
Columbus, MT 59019
Attention: Mr. Jerry Nelson

RE: Energy Equity Company, Walker 44-2, SE SE Section 2 T19N R53E
API 25-021-21108

Dear Mr. Nelson,

This well was last produced in January 2007. I have received a letter from the mineral owner, Eva Preston notifying me that your mineral lease under the Walker 44-2 well has lapsed due to nonproduction. She requests that Energy Equity plug and abandoned the Walker 44-2 well. (See Attached)

Per Rule 36.22.1303 requires the well to be plugged and abandoned or Energy Equity provides information that this well has a future use. My understanding is the well has mechanical issues and at this time cannot be produced. Energy Equity must submit a sundry stating the timetable and plan for plugging and abandoning this well.

36.22.1303 WELL PLUGGING REQUIREMENT

(1) The owner shall not permit any well drilled for oil, gas, saltwater disposal, or any other purpose to remain unplugged after such well is no longer useful for the purpose for which it was drilled or converted. When a well is no longer capable of production because the underlying reservoir or reservoirs are depleted and there is no possible future use for the well in supplemental recovery operations or for disposal facilities, the operator shall within one year plug and abandon the well as set forth in this subchapter, unless otherwise authorized by the petroleum engineer or his authorized agent.

History: 82-11-111, MCA; IMP , 82-11-123, 82-11-124, MCA; Eff. 12/31/72; AMD , 1998 MAR p. 482, Eff. 2/13/98.

Please contact me concerning your plans for this well. I can be reached at the Billings office at the number listed below.

Sincerely,

Steven Sasaki
Chief Field Inspector

Cc Eva L. Walker, Glendive, MT

DIVISION OFFICE
1625 ELEVENTH AVENUE
PO BOX 201601
HELENA, MONTANA 59620-1601
(406) 444-6675

TECHNICAL AND
SOUTHERN FIELD OFFICE
2535 ST. JOHNS AVENUE
BILLINGS, MONTANA 59102-4693
(406) 656-0040

NORTHERN FIELD OFFICE
201 MAIN STREET
PO BOX 690
SHELBY, MONTANA 59474-0690
(406) 434-2422

EXHIBIT 10

RECEIVED

NOV 22 2011

MONTANA BOARD OF OIL & GAS CONS. BILLINGS

Rosetta RESOURCES

November 21, 2011

Mr. Tom Richmond
Montana Board of Oil and Gas Conservation
Billings Technical Office
2535 St. Johns Avenue
Billings, Montana 59102

re: Fee Simonson Farms 3608-34-01H-B – Flaring Extension Request
API Number: 25-035-22183
Glacier County, Montana

Dear Mr. Richmond,

Rosetta Resources Operating LP respectfully requests an extension to flare the Fee Simonson Farms 3608-34-01H-B well, located on the Blackfeet Reservation in Glacier County, Montana. This letter was prompted by Rosetta's last internal meeting regarding flaring limitations in Montana. At this meeting, it was concluded that Rosetta needs to expand these limitations in order to completely evaluate its current and future Bakken wells. The summary below contains information regarding Rosetta's current well production and the required information to support Rosetta's request to continue flaring beyond the 60-day test period, as required by ARM 36.22.1220.

Current Producing Well Summary:

Fee Simonson 3608-34-01H-B

Completion Dates:	9/16/2011 – 9/19/2011
Flowback Dates:	9/19/2011 – 9/30/2011
Production Start Date:	10/1/2011

Rosetta is currently on day 52 of its 60-day allotted production term. Rosetta therefore requests an extension in order to further evaluate this well on an extended decline after the initial 60-day test period because this well is averaging over 100 Mcf/d. *See* ARM 36.22.1220(2).

Gas Analysis – See attached.

Estimated Gas Reserves

Although gas production is accompanying oil production in this well, gas is not being produced in sufficient quantities to justify the installation of a pipeline (see table below). Since Rosetta is still in the exploration phase, extended testing is needed to forecast any potential gas reserves. At this time, gas production is a bi-product of oil production and will only become valuable once development of infrastructure is economical.

Proximity of Well to Gas Market / Estimated Cost of Marketing Gas / Estimated Gas Price

There are 2 potential paths for Rosetta's gas to get to market. One path is the Omimex gathering system and the other is the Northwestern Energy pipeline. An overall synopsis of the distances to each market, the estimated costs for tying into their system, the estimated gas prices for each market, and the total cost for marketing Rosetta's gas is discussed below.

Market	Omimex	Northwestern Energy
Distance to Well	12.5 miles	5.625 miles
Est. Pipeline Cost	$ 2,750,000	$ 1,195,000
Est. Pipeline Pressure	<200 psi	650-875 psi
Compression Needed	MAYBE	YES
Compression Capital Cost	$ 125,000	$ 125,000
Compression LOE Cost	$ 20,000	$ 20,000
CO2 Treating Capital Cost	$ 125,000	$ 125,000
CO2 Treating LOE Cost	$ 15,000	$ 15,000
Estimated Gas Price	**$3.697 per Mcf**	**$3.485 per Mcf**
*from October 2011 prices		
Total Est. Capital Cost to Market Gas	**$ 3,000,000**	**$ 1,445,000**
Total Est. LOE Cost to Market Gas	**$ 35,000**	**$ 35,000**

Reinjection Potential

Due to the characteristics of the reservoir and the high costs of a re-injection plant, Rosetta does not believe reinjection to be a viable option at this stage of exploration.

Other Conservation-Oriented Disposition

Rosetta is examining various JT Plant (Joule Thomson) options and refrigeration practices to capture NGL's and to cut down on total gas flared. However, none of these methods have proven economical. As Rosetta collects more data throughout the field during exploration, Rosetta will be in a better position to identify its options and to evaluate them for potential implementation during development.

Amount of Gas Used in Operations

Rosetta is currently using produced gas to fuel its heater treater separation equipment. It is estimated that the gas usage for this equipment is equal to 15 Mcf/d. Although Rosetta has options to use produced gas to fuel its pumping unit engines, this gas has too many contaminants to warrant this use. Therefore, it is more economical to use purchased propane instead.

As the previous analysis demonstrates, the majority of information needed to justify Rosetta's request for a flaring extension has already been gathered. Any remaining data that may be needed to justify Rosetta's request is being compiled concurrently with the production of the well.

While Rosetta continues to test the extent of its acreage, it is important to note that marketing Rosetta's gas is not expected to be feasible or economical. It will likely not be until Rosetta goes into full

development that Rosetta starts to concentrate or develop in one specific area. At that point, Rosetta will put together and execute a plan to gather and market its gas. Until the development phase is implemented, it is essential for Rosetta to have an extended test period so that it may accurately evaluate the production, decline, and economic viability of this play.

If you require any additional information or have any questions, please do not hesitate to contact either Joshua Baumbach (Production Engineer) or myself. Joshua Baumbach can be reached at 713-335-4110 or joshua.baumbach@rosettaresources.com, and I can be reached at 713-335-4173 or daniel.busch@rosettaresources.com.

Thank you in advance for your assistance with this important matter.

Sincerely,

Daniel Busch
Regulatory Analyst

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Rosetta Resources Inc
Project: Simonson 34-01 HB
Lab ID: B11101913-004
Client Sample ID Simonson Gas

Report Date: 11/08/11
Collection Date: 10/20/11 11:00
DateReceived: 10/21/11
Matrix: Gas

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
GAS CHROMATOGRAPHY ANALYSIS REPORT							
Nitrogen	4.50	Mol %		0.01		GPA 2261-95	10/24/11 10:15 / jp
Carbon Dioxide	8.49	Mol %		0.01		GPA 2261-95	10/24/11 10:15 / jp
Hydrogen Sulfide	<0.01	Mol %		0.01		GPA 2261-95	10/24/11 10:15 / jp
Methane	69.19	Mol %		0.01		GPA 2261-95	10/24/11 10:15 / jp
Ethane	9.73	Mol %		0.01		GPA 2261-95	10/24/11 10:15 / jp
Propane	4.34	Mol %		0.01		GPA 2261-95	10/24/11 10:15 / jp
Isobutane	0.47	Mol %		0.01		GPA 2261-95	10/24/11 10:15 / jp
n-Butane	1.32	Mol %		0.01		GPA 2261-95	10/24/11 10:15 / jp
Isopentane	0.42	Mol %		0.01		GPA 2261-95	10/24/11 10:15 / jp
n-Pentane	0.48	Mol %		0.01		GPA 2261-95	10/24/11 10:15 / jp
Hexanes plus	1.06	Mol %		0.01		GPA 2261-95	10/24/11 10:15 / jp
Ethane	2.611	gpm		0.001		GPA 2261-95	10/24/11 10:15 / jp
Propane	1.200	gpm		0.001		GPA 2261-95	10/24/11 10:15 / jp
Isobutane	0.154	gpm		0.001		GPA 2261-95	10/24/11 10:15 / jp
n-Butane	0.418	gpm		0.001		GPA 2261-95	10/24/11 10:15 / jp
Isopentane	0.154	gpm		0.001		GPA 2261-95	10/24/11 10:15 / jp
n-Pentane	0.175	gpm		0.001		GPA 2261-95	10/24/11 10:15 / jp
Hexanes plus	0.448	gpm		0.001		GPA 2261-95	10/24/11 10:15 / jp
GPM Total	5.160	gpm		0.001		GPA 2261-95	10/24/11 10:15 / jp
GPM Pentanes plus	0.777	gpm		0.001		GPA 2261-95	10/24/11 10:15 / jp
CALCULATED PROPERTIES							
Gross BTU per cu ft @ Std Cond. (HHV)	1132			1		GPA 2261-95	10/24/11 10:15 / jp
Net BTU per cu ft @ std cond. (LHV)	1027			1		GPA 2261-95	10/24/11 10:15 / jp
Pseudo-critical Pressure, psia	689			1		GPA 2261-95	10/24/11 10:15 / jp
Pseudo-critical Temperature, deg R	407			1		GPA 2261-95	10/24/11 10:15 / jp
Specific Gravity @ 60/60F	0.816			0.001		D3588-81	10/24/11 10:15 / jp
COMMENTS							
-						-	/ jp

- BTU, GPM, and specific gravity are corrected for deviation from ideal gas behavior.
- GPM = gallons of liquid at standard conditions per 1000 cu. ft. of moisture free gas @ standard conditions.
- To convert BTU to a water-saturated basis @ standard conditions, multiply by 0.9825.
- Standard conditions: 60 F & 14.73 psi on a dry basis.

Report Definitions: RL - Analyte reporting limit. QCL - Quality control limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Rosetta Resources Inc
Project: Simonson 34-01 HB
Lab ID: B11101913-005
Client Sample ID Simonson Gas

Report Date: 11/08/11
Collection Date: 10/20/11 11:00
DateReceived: 10/21/11
Matrix: Gas

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
GAS CHROMATOGRAPHY ANALYSIS REPORT							
Nitrogen	4.51	Mol %		0.01		GPA 2261-95	10/24/11 10:48 / jp
Carbon Dioxide	8.49	Mol %		0.01		GPA 2261-95	10/24/11 10:48 / jp
Hydrogen Sulfide	<0.01	Mol %		0.01		GPA 2261-95	10/24/11 10:48 / jp
Methane	69.33	Mol %		0.01		GPA 2261-95	10/24/11 10:48 / jp
Ethane	9.73	Mol %		0.01		GPA 2261-95	10/24/11 10:48 / jp
Propane	4.34	Mol %		0.01		GPA 2261-95	10/24/11 10:48 / jp
Isobutane	0.47	Mol %		0.01		GPA 2261-95	10/24/11 10:48 / jp
n-Butane	1.32	Mol %		0.01		GPA 2261-95	10/24/11 10:48 / jp
Isopentane	0.42	Mol %		0.01		GPA 2261-95	10/24/11 10:48 / jp
n-Pentane	0.48	Mol %		0.01		GPA 2261-95	10/24/11 10:48 / jp
Hexanes plus	0.91	Mol %		0.01		GPA 2261-95	10/24/11 10:48 / jp
Ethane	2.611	gpm		0.001		GPA 2261-95	10/24/11 10:48 / jp
Propane	1.200	gpm		0.001		GPA 2261-95	10/24/11 10:48 / jp
Isobutane	0.154	gpm		0.001		GPA 2261-95	10/24/11 10:48 / jp
n-Butane	0.418	gpm		0.001		GPA 2261-95	10/24/11 10:48 / jp
Isopentane	0.154	gpm		0.001		GPA 2261-95	10/24/11 10:48 / jp
n-Pentane	0.175	gpm		0.001		GPA 2261-95	10/24/11 10:48 / jp
Hexanes plus	0.385	gpm		0.001		GPA 2261-95	10/24/11 10:48 / jp
GPM Total	5.096	gpm		0.001		GPA 2261-95	10/24/11 10:48 / jp
GPM Pentanes plus	0.713	gpm		0.001		GPA 2261-95	10/24/11 10:48 / jp
CALCULATED PROPERTIES							
Gross BTU per cu ft @ Std Cond. (HHV)	1126			1		GPA 2261-95	10/24/11 10:48 / jp
Net BTU per cu ft @ std cond. (LHV)	1022			1		GPA 2261-95	10/24/11 10:48 / jp
Pseudo-critical Pressure, psia	689			1		GPA 2261-95	10/24/11 10:48 / jp
Pseudo-critical Temperature, deg R	407			1		GPA 2261-95	10/24/11 10:48 / jp
Specific Gravity @ 60/60F	0.812			0.001		D3588-81	10/24/11 10:48 / jp

COMMENTS

- / jp

- BTU, GPM, and specific gravity are corrected for deviation from ideal gas behavior.
- GPM = gallons of liquid at standard conditions per 1000 cu. ft. of moisture free gas @ standard conditions.
- To convert BTU to a water-saturated basis @ standard conditions, multiply by 0.9825.
- Standard conditions: 60 F & 14.73 psi on a dry basis.

Report Definitions: RL - Analyte reporting limit. QCL - Quality control limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

Wellname	Completion Date	Start Date	Latest Production				Cumulative Production		
			Oil Rate, bbl/d	Gas Rate Mcf/d	GOR, Mcf/bbl	Date	Oil, bbl	Gas, Mcf	GOR
Fee Simonson Farms 3608-34-01H-B	9/19/2011	10/1/2011	45	281	6.24	11/18/2011	1396	5246	3.76